MONTHLY WEATHER REVIEW.

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ANNUAL REPORT BY WILLIS L. MOORE, CHIEF OF THE WEATHER BUREAU, FOR THE FISCAL YEAR ENDING JUNE 30, 1906.[1]

[Dated August 30. Extract from the report of the Secretary of Agriculture, issued December 15, 1906.]

I have the honor to submit a report of the operations of the Weather Bureau during the fiscal year that ended June 30, 1906.

OPERATIONS OF THE YEAR.

FORECASTS AND WARNINGS.

Weather forecasts for thirty-six and forty-eight hours in advance have been made daily thruout the year for each State and Territory, and special warnings of gales on the seacoasts, Gulf, and Great Lakes, and of cold waves, frosts, heavy snows, floods, etc., have been issued when the advices were calculated to benefit commercial and agricultural interests. The North Atlantic and West Indian storm-warning service was continued, and forecasts for the first two days out for steamers bound for European ports were issued daily at 8 a. m. and 8 p. m. The work of the Forecast Division is under the special supervision of Prof. E. B. Garriott; the River and Flood Service is in charge of Prof. H. C. Frankenfield.

The material necessary in the forecast and warning service has been gathered twice daily by telegraph and cable from about 160 stations in the United States, 19 in Canada, and about 20 in the islands of the Atlantic and on the western coast of Europe; in all, about 200 reports have been received in the morning and a lesser number in the evening. Eight forecast centers have been maintained, as follows:

Washington, D. C.—A. J. Henry, Professor and National Forecaster; H. C. Frankenfield, Professor and National Forecaster.

Boston, Mass.—John W. Smith, District Forecaster.

New Orleans, La.—I. M. Cline, District Forecaster.

Louisville, Ky.—F. J. Walz, District Forecaster.

Chicago, Ill.—H. J. Cox, Professor and District Forecaster.

Denver, Colo.—F. H. Brandenburg, District Forecaster.

San Francisco, Cal.—A. G. McAdie, Professor and District Forecaster.

Portland, Oreg.—E. A. Beals, District Forecaster.

Altho no important change has been made during the year, either in the character of the available material or in the manner of its application to the problem in hand, constant effort has been put forth to improve the forecast service. In another portion of this report reference will be made to the work accomplished in the way of seeking new physical data, both solar and terrestrial, in the hope of successfully applying them to weather forecasting.

It was the hope of leading meteorologists some twenty years ago that a study of the pressure distribution over the globe, especially the shifting of great air masses in latitude and longitude, would yield valuable results. In more recent years the subject has been further pursued and a fairly close relation has been established between the pressure distribution over the Atlantic and the character of the weather over western Europe. In this country studies of atmospheric pressure distribution in the United States in its relation to long-period fluctuations in temperature and rainfall have been made by Garriott, Fassig, Henry, and McAdie. In general, however, these studies did not attempt to deal with the relation between current weather conditions and pressure distribution over continental and oceanic areas, for the reason that daily barometric readings from oceanic areas were not available. Cable connection with the Azores was effected a year or so since, and within the year just closed communication with Honolulu was established. Reports from these stations, including Bermuda and the west coast of Europe, throw considerable light upon the atmospheric movements in the United States, and the study of these movements in the light thus afforded is the distinctive work of the year. The result has been sufficiently encouraging to warrant its further prosecution and a still further enlargement of the field of view by the courtesy of foreign meteorological services.

ENLARGEMENT OF THE FIELD OF OBSERVATION.

Already correspondence has been entered into with the director of the physical observatory, St. Petersburg, Russia, with a view to securing daily reports from Siberia, the seat of the great winter area of high pressure in the Northern Hemisphere.

The Bureau also has in preparation a plan of organization for a service in Alaska by means of which prompt advices may be received of changes in the Bering Sea area of low pressure, which are intimately associated with the weather of the United States.

The extension of the field of observation over the adjacent oceans is not yet fully developed. The essential features of this service provide for the collection, by means of wireless telegraphy, of simultaneous meteorological observations from vessels at sea, and the dispatch of weather forecasts and storm warnings to all vessels within the zone of communication that are equipped with wireless apparatus. The details of the plan have been worked out, and arrangements have been made with the Marconi Wireless Telegraph Company of America and with the American De Forrest Wireless Telegraph Company to transmit the observations from the vessels to the Weather Bureau at a stipulated rate; also to transmit weather forecasts and storm warnings from the Weather Bureau to vessels at sea without charge.

This service is under the direction of the Division of Ocean Meteorology, and was placed in tentative operation aboard the vessels of the American Line December 1, 1905, the first dispatch being received from the steamship *New York*, Captain

[1] Reprinted with a few verbal alterations for publication in the Monthly Weather Review, for the information of cooperative observers and foreign correspondents.—EDITOR.

Roberts, December 3, the position of the vessel at the time being latitude 40° N., longitude 60° W., or about 600 miles east of Sandy Hook.

Subsequently the service was extended to the following-named vessels of other lines, all equipped with the Marconi apparatus, viz:

North German Lloyd: Steamships *Grosser Kurfurst, Kaiser Wilhelm II, Kaiser Wilhelm der Grosse, Kronprinz Wilhelm.*

Hamburg American Line: Steamships *Amerika, Bluecher, Deutschland, Kaiserin Augusta Victoria.*

Cunard Line: Steamships *Campania, Carmania, Caronia, Carpathia, Etruria, Ivernia, Lucania, Pannonia, Slavonia, Ultonia, Umbria.*

White Star Line: Steamships *Baltic, Cedric, Celtic, Majestic, Oceanic.*

Compagnie Generale Transatlantique: Steamships *La Bretagne, La Lorraine, La Provence, La Savoie, La Touraine.*

All the above-named vessels, including the steamships *New York, Philadelphia, St. Paul,* and *St. Louis,* of the American Line, are now authorized to transmit their daily Greenwich mean noon observations to the Bureau.

The privilege has also been extended to the following vessels equipped with the De Forrest system:

Panama Railroad and Steamship Line: Steamships *Advance, Allianca, Colon, Finance, Panama.*

Mallory Line (New York to Galveston): Steamships *Concho, Denver, San Jacinto.*

The service and code have also been adopted by the U. S. Navy Department, and all vessels of the U. S. Navy are instructed to transmit the daily weather dispatch while at sea. The wireless telegraph stations controlled by the Navy Department are also required to receive weather messages from merchant vessels and to transmit them to the Bureau, likewise to dispatch the weather forecasts and storm warnings issued by the Bureau to vessels at sea demanding them, free of cost.

The service in connection with the merchant marine is not yet in good working order, owing to its novelty, the inexperience of both observers and operators, and other considerations of a financial character.

EXTENSION OF STORM-WARNING SERVICE.

The storm-warning service has now been extended to include all wireless telegraph stations of the Navy Department along the coasts of the Atlantic, the Pacific, and the Gulf of Mexico. These stations receive storm-warning messages from the Weather Bureau and transmit them to light-ships and vessels in the zone of communication that are equipped with wireless apparatus. A similar service has also been inaugurated with the Marconi company by means of which its stations transmit to vessels equipped with the Marconi apparatus messages containing storm advices.

Ten additional storm-warning display stations have been furnished with steel towers and high-power lanterns for night displays. One hundred and seventy-two display stations on the Lake, Gulf, and seacoasts of the United States are now provided with improved apparatus for the better display of storm warnings. No station of any importance to shipping and commercial interests remains to be equipped, and this important work, which was begun in 1900, is now practically complete.

STORMS OF THE YEAR.

The most important and only severe tropical storm of the year advanced from the Caribbean Sea, south of San Domingo, northward over the eastern Bahamas, and thence northeastward over the Atlantic Ocean during the early part of October, 1905. On the 11th, when this storm was central near the eastern edge of the banks of Newfoundland, the steamship *La Savoie* reported the remarkable barometer reading of 27.92 inches, and the steamship *Campania* encountered a disastrous storm wave. Advices to West Indian, Atlantic, and Gulf coast interests regarding the storm were begun with its first appearance over the Caribbean Sea and continued daily until it recurved northeastward over the Atlantic Ocean, when advices to Canadian maritime ports were begun and continued until the center passed Bermuda. Lloyds, London, was also advised that a severe tropical storm was moving from Bermuda northeastward toward the trans-Atlantic steamship routes.

In the autumn of 1905 the Lake region was visited by several storms of exceptional severity, in connection with which the work of the Weather Bureau was conspicuously valuable. Ample and timely warnings were issued of severe cold waves and damaging frosts, and, in the Southern States especially, the advices were of great value to garden and trucking interests.

A notable advance in the frost-warning service has been made in the cranberry districts of Wisconsin, Massachusetts, and New Jersey, where special observations of air and soil temperatures are being utilized to improve the accuracy of the forecasts during the growing season.

RIVER SERVICE.

No important floods occurred during the year. Action has been taken to extend the river and flood service in California and South Carolina, and the river and special rainfall stations of the country as a whole have been improved as the needs of the service demanded and the fund permitted.

DISTRIBUTION OF FORECASTS AND SPECIAL WARNINGS.

First and foremost in the effective distribution of daily weather forecasts and special warnings are the daily newspapers and the various press associations. Closely following these in importance is the telephone, not only in rural districts but also in the great centers of population. During the year just ended over half a million telephones were added to those already receiving forecasts and warnings thru the telephone exchanges.

Aside from the distribution thru the press associations, the daily newspapers, and the telephone, it has been found necessary to telegraph forecasts and warnings direct to a number of places in the different States and Territories at the expense of the Bureau, it being impossible to serve the interests involved thru the press associations. The number of addresses in the United States to which forecasts and special warnings are sent by telegraph is 2150. Special warnings only are sent to 767 addresses, and emergency warnings, *when issued,* to 5998 addresses. Distribution without expense to the Bureau is made to 76,719 addresses by mail, to 82,466 by mail thru the rural free-delivery service, to 1,014,285 by telephone, to 2,145 by railroad telegraph lines, and to 2,514 by railroad train service.

INCREASE IN THE NUMBER OF METEOROLOGICAL STATIONS IN THE UNITED STATES.

This report would be incomplete without mention of the great increase in the administrative work involved in the operation and maintenance of a central office in the city of Washington and 187 first-order stations at various outlying points, the latter employing in all 513 persons. The number of first-order stations ten years ago was 131. The increase is due to a constantly growing demand for weather information from various parts of the country hitherto not occupied by a reporting station of the Bureau. Aside from the stations above named, the Bureau employs nearly 900 persons at nominal salaries for the following purposes, viz, 160 for the display of storm warnings along the seacoasts and the Great Lakes; 340 persons in taking observations of river stages and rainfall; 107 persons in taking rainfall observations on the headwaters of various streams; 154 persons in taking observations of the weather in the cotton-growing States; 133 persons in taking observations of the weather in the corn and wheat growing States; in all, 897 noncommissioned employees, each of whom, however, devotes probably less than half an hour daily to the service of the Bureau.

In addition to the above, the climatic conditions in the United States and its outlying possessions are being recorded at about 3700 points known as cooperative stations. The most important climatic elements, viz, temperature and precipitation, are observed at these stations with standard instruments, and the general weather conditions are carefully noted and recorded. The total number of points within the United States, at which observations suitable for a discussion of the climatic conditions of the country are taken, is therefore about 4500.

ESTABLISHMENT OF NEW CLIMATIC STATIONS AT HIGH LEVELS.

An effort was made during the year to establish, thru the cooperation of the Forest Service of this Department, a number of stations on the mountain ranges, with a view of determining the amount of precipitation and the temperature conditions at high levels. Thus far the results have not come up to expectation.

THE DISTRIBUTION OF METEOROLOGICAL INFORMATION.

The immense output of meteorological information that comes from the various stations maintained by the Bureau is exhibited to the public in various ways. The daily output finds its way to the public mainly thru the columns of the newspapers and in the maps and bulletins issued at Washington and outlying stations. The daily issue of maps in Washington is about 1625 copies. Outside of Washington there are 105 stations, which issue an aggregate of 25,000 maps daily, making a yearly issue of over 8,000,000 copies.

During the crop-growing season a weekly résumé of the weather conditions in all parts of the country is printed and distributed in the form of State and National weather bulletins. The National Weather Bulletin, of which 2500 copies were issued June 30, 1906, contains a statement of the weather conditions over the entire country; while the State or district bulletins, of which 31,190 were issued at 44 centers on June 30, 1906, give a résumé of the weather conditions in the State or district only.

CHANGE IN NATIONAL AND STATE BULLETINS.

During the year all matter relating to crop conditions was eliminated from the weekly and monthly weather bulletins issued at the section centers, and at Washington, D. C., in order that more emphasis could be placed upon the meteorological conditions prevailing in the various States and Territories.

PRINTED REPORTS OF WEATHER CONDITIONS.

As above stated, the daily weather conditions are printed in some detail on the daily weather maps, but inasmuch as the the supply of maps is necessarily limited and there is no issue on Sundays or holidays, each section center, of which there are 44, prints a monthly summary of weather conditions, including a statement of the highest and the lowest temperatures and the total precipitation for each day of the month, so that the important climatic features in all parts of the country are made of record and can be found in print.

The number of monthly climatological reports printed at the various section centers is 30,944, being an average of about 700 copies each per month. The work of the Climatological Division is intrusted to Mr. James Berry, Chief of Division.

MONTHLY WEATHER REVIEW.

In the same category, but on a somewhat larger scale, the Weather Bureau publishes in the MONTHLY WEATHER REVIEW a résumé of the weather in the United States, as shown by the reports of about 4500 stations. This publication has been issued regularly under the editorship of Professor Abbe. In addition to the climatological tables and charts, it contains a report on the work relating to forecasts and warnings, rivers and floods, and a summary of the weather for the month. It is also a medium of communication for the exchange between members of the service of views and experiences in Weather Bureau work. Distinguished meteorologists outside of the service have freely contributed to its columns, so that it has become recognized as an important aid to the officials of the Bureau.

METEOROLOGY OF THE OCEANS.

As stated in my last report, the control of meteorological work on the oceans was transferred from the Navy Department to the Department of Agriculture, and assigned to the Weather Bureau. The function of the Weather Bureau in the matter of meteorological observations over the oceans is the collection of information respecting atmospheric disturbances, winds, temperature, densities, ice conditions; the prevailing weather on sailing and steamship routes; and the reduction and publication of this information in such form as will prove of the highest value to commerce and navigation.

The information in question is obtained entirely thru a system of voluntary cooperation with the Bureau on the part of the navy and merchant marine of every maritime nationality on the globe, a specifically designated observer aboard each cooperating vessel being under instructions from the master to furnish the Bureau with certain daily observations; the Bureau, in return, furnishing the master of such vessel and the observer with a copy of such publications as may be founded on the observations in question.

Instructions to the local offices of the Weather Bureau interested in the conduct of the work were issued early in the year by Mr. James Page, in charge of the Division of Ocean Meteorology. These offices are at present as follows:

Portland, Me.	New Orleans, La.	Tampa, Fla.
Boston, Mass.	Galveston, Tex.	Seattle, Wash.
New York, N. Y.	Tacoma, Wash.	Portland, Oreg.
Philadelphia, Pa.	Wilmington, N. C.	San Francisco, Cal.
Baltimore, Md.	Charleston, S. C.	San Diego, Cal.
Norfolk, Va.	Jacksonville, Fla.	Honolulu, H. I.
Pensacola, Fla.	Savannah, Ga.	
Mobile, Ala.	Key West, Fla.	

The number of weather reports received during the year was 8160, and their geographical distribution covering the period July, 1905, to June, 1906, inclusive, was as follows: North Atlantic Ocean, 6555; South Atlantic Ocean, 441; North Pacific Ocean, 1030; South Pacific Ocean, 327; Indian Ocean, 110. The number of vessels reporting was 1771.

MOUNT WEATHER RESEARCH OBSERVATORY.

The meteorological work of a first order station has been maintained thruout the year, and telegraphic reports were transmitted to the Central Office in Washington daily at 8 a. m. and 8 p. m.

Work on the physical laboratory was resumed in July and satisfactory progress was made during the summer and fall of 1905. The building will probably be completed early in 1907.

In the preparation for kite and balloon work a number of important instruments have been installed and made ready for systematic work. Among these may be mentioned: (1) The electrolyzer, for the manufacture of the hydrogen gas employed in the kite balloon and the small rubber balloons; (2) the apparatus for the manufacture of liquid air, employed in testing thermometers at very low temperatures; (3) the apparatus used in testing the barometers, thermometers, and meteorographs employed in connection with the kites and balloons. A medium-sized power kite-reel was installed in the revolving kite-house early in the year, and experimental kiteflying was begun in September of 1905. During the year the stock of meteorographs, of kites, and of kite wire was materially increased; the instrumental equipment now includes eight different styles of kite-balloon meteorographs, comprising English, German, and French designs, in addition to the Marvin type heretofore used in the kite work of the Bureau, and the new Fergusson pattern used at the Blue Hill Observatory.

In April, 1906, systematic cooperation was begun in connection with the work of the International Committee for Scien-

tific Ballooning by flying kites on prearranged term days, and this work is being regularly maintained.

The interior finishings of the magnetic observatory buildings, the erection of the piers, and the installation of the magnetic instruments were completed during the year.

The instruments for absolute observations, except the declinometer and some auxiliary apparatus, were received and set up before January 1, 1906. The remaining absolute instruments were received and put in place by the end of May, and routine observations were established at the end of the fiscal year.

The Eschenhagen magnetographs were set up in the basement of the absolute observatory in December, 1905, and have given a satisfactory record of the magnetic elements since that time. The Wild magnetographs were received and installed by the first of June, and were being adjusted by the end of the fiscal year.

A gas plant for heating and illuminating the magnetic observatories was put in during the winter and has given satisfactory service since then.

Plans were prepared for an additional office and dwelling for the director of upper-air research, and work on this building was begun July 1, 1906.

SOLAR RADIATION.

From May 1 to November 27, 1905, Mr. H. H. Kimball was detailed for duty at the astrophysical observatory of the Smithsonian Institution. Here, thru the courtesy of the late Prof. S. P. Langley, in addition to maintaining solar-radiation observations with the Ångström pyrheliometer, and measurements of the maximum polarization of skylight with the Pickering polarimeter, comparisons were made between this pyrheliometer and the actinometers in use at the observatory, and valuable experience was obtained in the use of the bolometer and in the reduction of actinometric and bolometric observations. As a result of this experience the system under which solar-radiation observations have been maintained since April, 1903, has been materially modified.

SPANISH-ALGERIAN ECLIPSE EXPEDITION.

In compliance with the request of Rear-Admiral C. M. Chester, U. S. Navy, Superintendent of the Naval Observatory, for the Weather Bureau to cooperate in the expedition to observe the total eclipse of the sun, August 30, 1905, the meteorological work of the expedition was assigned to Prof. Frank H. Bigelow, with Dr. Stanislav Hanzlik as his principal assistant. Other assistants were appointed by Rear-Admiral Chester from among the naval force, and three primary stations were equipped and operated, viz, at Daroca, and Porto Coeli, in Spain, and Guelma, in Algeria. Secondary stations were established at Castellon, Tortosa, Zaragoza, and Guadalajara, in Spain, and at Bona, in Algeria. The Spanish officials extended every possible courtesy in facilitating the operations of the expedition. An extensive series of observations was secured during August, 1905, including the usual meteorological elements, the coefficient of dissipation, the ionization contents, and the potential gradient of the atmospheric electricity, the solar radiation and the polarization.

On the voyage between Hampton Roads and Gibraltar several kite ascensions were made over the ocean, and numerous electrical and polarization observations were secured.

A report of the results of the meteorological work of the expedition has been prepared by Professor Bigelow and transmitted to the Navy Department for publication with the report of the astronomical researches.

LIBRARY.

It is the aim of the librarian, Mr. H. H. Kimball, to obtain all standard works of reference and technical books on meteorology and allied sciences for the use of Weather Bureau officials in Washington and elsewhere; also, to collect and preserve printed climatological data from all parts of the world. While many general reference books are of necessity duplicated in other government libraries, this is not the case with respect to purely meteorological and climatological works. Even the Library of Congress refers readers to the Weather Bureau library when extensive research along these lines is to be made.

Many important books and publications can only be obtained by purchase; but by far the greater number have been received in exchange for Weather Bureau publications, or given by authors and publishers. During the last year 416 were obtained by gift and exchange, while only 116 were purchased.

The work of extending the exchange system so as to include as nearly as possible all climatological data published thruout the world is now being systematically carried on. This literature will in time be fully cataloged and made accessible to students. For the present special attention is being paid to those regions of the world which have been least explored by meteorologists, and for which, therefore, such meteorological data as exist are in the greatest need of being collected and preserved. This climatological work is the special field of Mr. Talman, assistant librarian, who utilizes the rich resources of the library in preparing a monthly international review of climatology for the MONTHLY WEATHER REVIEW. Such work is undertaken primarily in response to the demands constantly made upon our library for information regarding meteorology of foreign lands, but it is also in accord with the spirit of international investigation which now prevails generally among progressive meteorologists.

Lists of the more important books added to the library, and of important papers relating to meteorology that have appeared in current periodicals, have been prepared for publication in each number of the MONTHLY WEATHER REVIEW.

METEOROLOGICAL RECORDS.

The Division of Meteorological Records and the Barometry Section have been united during the year and placed in charge of Prof. Frank H. Bigelow. The care of the manuscript records of the meteorological observations made thruout the service, the checking of the computations, the preparation of the tabular data for the MONTHLY WEATHER REVIEW and the annual report, and the supplying of the public with information, including the Federal Departments and Bureaus, State, county, and city officials, civil engineers, and many individuals, are in charge of this division. The discussion of the records and the compiling of data for scientific purposes, especially the relations of solar physics to meteorology, are carried on as far as practicable. Special attention is given at present to the temperature data, and tables of station normals based upon thirty-three years of observations reduced to a homogeneous system, together with the annual and monthly variations, are being prepared. At the same time similar data for the vapor pressure are being computed. These works, when finished, together with the barometry of the United States already published, will constitute a fundamental system of data upon which scientific studies of the variable climatic conditions may properly be based.

THE TEACHING OF METEOROLOGY.

The officials of the Weather Bureau have had their attention forcibly drawn to the teaching of meteorology by the increased recognition of that science as a branch of study appropriate to high schools, normal schools, colleges, and universities. In answer to circular letters sent out by Professor Abbe it would appear that elementary climatology, considered as a part of geography, is taught in about 1000 graded schools. Elementary climatology and meteorology are taught in connection with geology in about 7000 high schools, or seven-eighths of the whole number that are cataloged by the Bureau of Education.

Specific courses in meteorology or climatology are given in about 140 out of 177 public normal schools, altho in some of

these the subject is taught in connection with physical geography. Out of 311 colleges and universities from which direct replies have been received, 59 state that they have specific courses in meteorology, 133 teach this in connection with some other subject, and 119 pay no attention to it. The corresponding percentages are 19, 43, and 38, and probably the replies from other colleges will not alter these ratios very much. In fully one-half of these institutions, from the lower schools to the higher universities, some form of laboratory method is pursued—that is to say, students are required to make personal observations, experiments, and deductions. They study the daily weather map and develop habits of individual thought. In a matter so complex as the weather, no text-books can replace the daily map, personal observations, and independent study.

In addition to the popular work of the high schools and colleges, a higher class of work has been carried out by the scientific schools and universities. This special technical instruction is divided into two parts—that which is done by the scientific faculty as such and that which is done by Weather Bureau officials temporarily appointed as instructors, who sometimes do this educational work without extra compensation from the colleges. There are 19 of the latter and about 50 of the former.

Effort is being made to correlate and reduce to a uniform system the standard of instruction to be given at these institutions, so that, at least in some cases, these scientific schools may prepare men for the highest work that is required of a Weather Bureau official.

INSTRUMENTAL EQUIPMENT.

The Instrument Division, in charge of Prof. C. F. Marvin, supervises the equipment for the work of both regular and special stations.

Systematic efforts were continued during the year to bring as many as possible of the long-established telegraphic-reporting stations up to the uniform standard of equipment as now furnished new stations, and the instrumental outfits at Grand Haven, Mich.; Mobile, Ala.; Red Bluff, Cal.; North Platte, Nebr.; Baker City, Oreg.; Winnemucca, Nev., and Abilene, Tex., were completed. It is hoped to finish this work during the next fiscal year, as there still remain in the service only a few stations where the improved automatic self-recording instruments are required for climatological or local interests.

New stations at Anniston, Ala.; Thomasville, Ga.; Del Rio, Tex.; Iola, Kans.; Bentonville, Ark.; Burlington, Vt.; Tonopah, Nev., and Canton, N. Y., were completely equipped with new instruments, and a duplicate equipment was sent to San Jose and San Francisco, Cal., the equipments for the two last-named stations being required on account ot the total destruction of the instruments formerly in use there by the disastrous earthquake and fire of April 18, 1906. These two stations were completely wiped out of existence in a few hours, involving the loss of several thousand dollars' worth of instruments and apparatus, to say nothing of valuable records and data that neither time nor money can replace.

INVESTIGATION OF FROST CONDITIONS IN CRANBERRY REGIONS.

Prof. Henry J. Cox, in charge of the north-central forecast district, with headquarters at Chicago, was authorized to take up a carefully studied project of work in the cranberry marshes of Wisconsin, with a view to obtaining more precise and detailed information concerning the meteorological and soil conditions in that section which shortly precede, accompany, and follow frosts than is obtainable from the ordinary Weather Bureau observations made at relatively widely separated stations. The definite object in view is to establish a scientific basis for more accurate frost prediction for those sections of the country devoted to this special industry.

The equipment of instruments comprised soil thermometers and thermographs, Assmann's aspiration psychrometers, and ordinary thermographs for recording air temperatures, together with other standard instruments of the usual types. Owing to delays in the delivery of the important instruments purchased in European markets, observations of the late spring frosts could not be made, and on this account the work will no doubt require to be extended longer than was originally contemplated.

RIVER-STAGE INDICATOR.

The vast importance which attaches, in flood seasons, to the stages of large navigable rivers makes an instrument that will indicate at all times, in the local offices of the Weather Bureau at stations situated on these rivers, the exact stage of the water a practical necessity. Heretofore devices of this character have been debarred, not only because of the considerable expense involved in their installation, but also because a suitable form of apparatus at reasonable cost was not on the market. During the past year, however, a form of instrument developed by Professor Marvin was perfected and promises to prove very satisfactory. One was installed at Portland, Oreg., and recently steps have been taken to place a similar instrument at Pittsburg, Pa.

By the aid of this instrument the official needs only to look at the dial indicator on the wall of his office, from which the stage of the river at that station is quite easily read. The instrument also indicates whether the river is rising or falling.

EARTHQUAKES AND THE RELATIONS OF THE WEATHER BUREAU TO THEIR REGISTRATION.

Attention has been drawn to the scientific observation of earthquakes by the calamity that befell San Francisco on the 18th of April, 1906, and it seems proper at this point to recall briefly the part taken by the Weather Bureau in this direction. As early as 1886, shortly after the great Charleston earthquake, Professor Marvin's first seismoscope was installed at Washington, D. C. This instrument was able to show, by the stopping of a clock, only the time of beginning of certain slight disturbances. At that early date accurate seismographs were not in existence except, perhaps, a few imperfect forms developed by Ewing, Gray, and Milne in Japan. The removal in 1888–89 of the Central Office of the Weather Bureau to its present location resulted in an interruption of the seismic observations. A better seismoscope, also designed by Professor Marvin, but still of very simple form, was installed in 1893, and for many years was practically the only instrument for the purpose in the United States that was diligently maintained in continuous action. In the meantime, however, far more delicate and complete instruments had been developed in Japan and elsewhere, and one of the best modern types, making a complete record of the horizontal motion of the ground, was installed at the Weather Bureau in February, 1903. This is known as the Omori or Bosch-Omori horizontal pendulum seismograph.

A number of distant earthquakes were recorded on this instrument, which was reinstalled in a much improved fashion shortly before the San Francisco disturbance. The great earthquake was admirably recorded at the Weather Bureau, the motion being so violent as to carry the pen off the sheet for a portion of the time, causing a loss of record for about three minutes, after which, as the violence of the motion subsided, the pen resumed its record. The fact that altho no one in Washington could feel the motion of the ground yet the instrument made a record larger than the sheet could contain shows how very sensitive it is to the vibrations of the earth. No other instruments of this character are maintained by the Weather Bureau at the present time, and it seems proper at this place to call attention, very briefly, to certain important considerations bearing upon the question of seismic observations.

It is now well known that the whole crust of the earth is very frequently shaken by earthquakes, and that several thousand disturbances, great and small, occur every year. A complex and difficult geophysical problem is presented in these

phenomena, which are now just beginning to be observed and studied in a systematic manner.

After several preliminary conferences an international bureau of seismology was finally established during the current year, which has been joined by nearly all the principal civilized nations of the world. The part to be taken by the United States Government in this important seismological work is at present entirely unorganized and ill defined, but I desire at this time to point out that the Weather Bureau is prepared and qualified to contribute to this work in an effective manner with but little additional expense. It has numerous stations widely distributed and manned by specially trained and skilful observers. It also employs means for collecting and distributing information that can hardly be surpassed. These circumstances render it proper for the Weather Bureau to undertake the systematic registration of earthquakes by means of instruments of the highest type at a small number of its stations. A considerable number of stations is not necessary for the general international work; ten or fifteen will probably answer every requirement. Conditions most favorable for the installation of seismographs will probably be found at stations where Weather Bureau buildings have been erected.

TELEGRAPH, TELEPHONE, AND CABLE LINES.

The Telegraph Division, under Mr. J. H. Robinson, is charged with all details relative to messages by telegraph and telephone, and the construction and maintenance of lines of communication.

An important addition to the system of Weather Bureau telephone lines and cables on the Great Lakes was made on September 12, 1905, by the laying of a submarine cable from Charlevoix, Mich., to St. James, Beaver Island, Mich., a distance of 33½ miles. A connecting land line 2 miles long was built during June, 1906, from St. James to Church Hill, on the same island. Aside from its main object—the transmission of storm-warning messages to the displaymen at St. James and Church Hill—the cable connection with the mainland is of no little importance to the business interests of Beaver Island.

The telephone line from Grand Marais to Vermillion, Mich., was extended to Whitefish Point, a distance of 10 miles. The entire section is jointly owned and operated by the Weather Bureau and the Life-Saving Service, and affords the sole communication for a chain of storm-warning and life-saving stations on eastern Lake Superior.

The other sections of the Weather Bureau telegraph and telephone lines on the lake and seacoasts were maintained in efficient working order, excepting only the line from San Francisco to Point Reyes Light, Cal., which was partly destroyed by the great earthquake of April 18, 1906.

The receipts from private messages transmitted over Weather Bureau lines amounted to $3036.84. In addition, $2101.92 was collected for connecting commercial lines.

REPORTS OF PASSING VESSELS.

A total of 26,818 vessels of all rigs was reported from the several Weather Bureau stations on the Atlantic, the Pacific, and the Gulf coasts direct to the owners, agents, and maritime associations concerned. Special reports of shipwrecks and other marine casualties were made when opportunity offered.

EXAMINATION AND PROMOTION.

Examinations serve two useful purposes: (1) They stimulate systematic study on the part of the younger men; (2) and they afford an index to educational attainments that is of assistance in selecting men for promotion.

In order that they may serve as a mental stimulus, they must be of such character that they can be past by a majority of those who undertake them, since repeated failures are a discouragement. On the other hand, in order that they may be useful in selecting men for promotion to important positions, they must be of such character that they will clearly indicate the ability of the person examined. It is to the interest of all concerned that an examination should call attention to deficiencies in education where such exist, since by determined effort such deficiencies can in almost every case be overcome.

It having become evident that examinations heretofore given in English grammar were tests of technical knowledge of the construction of the language rather than ability to use it correctly, the supervising examiner was instructed to include in this examination, in addition to exercises in false syntax, an essay of not less than 500 words, and also to mark the grammatical construction of the answers to the questions in elementary meteorology. The essays thus far graded indicate a very general defect in the style of a majority of the persons examined, in the following respects: (1) The frequent repetition of words; (2) the use of unnecessary words and phrases; (3) faulty arrangement of the parts of a sentence, so that in some cases the meaning conveyed is directly opposite to that which was intended; (4) bad punctuation, long paragraphs, containing several independent ideas, sometimes being written as a single sentence. In general, faulty construction and bad style are more common than glaring grammatical errors. Emphasis is laid upon these facts because it is necessary for assistant observers to write good English before they are fit to take charge of stations and prepare reports for publication.

The following table gives the number of examination papers marked during the year by the supervising examiner, Mr. H. H. Kimball:

Subject.	Date of examination.					Number of employees examined.		
	1905.			1906.				
	June.	Sept.	Dec.	Mar.	June.	Total.	Past.	Failed.
English grammar	6	5	7	31	18	67	52	a 15
Arithmetic	6	4	6	10	7	33	26	7
Elementary meteorology	5	6	6	9	4	30	24	6
Algebra	3	4	7	9	4	27	23	4
Physics	3	3	5	5	8	24	20	4
Trigonometry	5	5	2	5	8	25	20	5
Astronomy	4	2	2	4	3	15	14	1
Plant physiology	1	......	5	3	5	14	14	0
Advanced meteorology	1	......	3	5	2	11	11	0
Total	34	29	43	81	50	246	204	42

a One thrown out because of dishonesty in connection with the examination.

OBSERVATORY BUILDINGS.

The Weather Bureau buildings referred to in my last report as being in course of construction at Bentonville, Ark., Burlington, Vt., North Platte, Nebr., Oklahoma, Okla., Springfield, Ill., and a physical laboratory at Mount Weather, Va., have been completed and are now occupied, with the exception of the last, which will probably be completed before July 1, 1907.

It has been found not only economical to the Government but advantageous to the prompt and efficient administration of the Weather Service, at many places, to rent small buildings which provide office rooms and living quarters for the observer. These buildings are usually cottages, and only those having grounds large enough to insure a satisfactory exposure for meteorological instruments are selected. When the observer lives in the same building in which the automatic instruments are installed it insures their having constant attention, and the public can obtain at any time forecasts and information in regard to storms, cold waves, etc. The accompanying list shows the places at which such buildings are rented by the Weather Bureau, the annual rent paid, and the items included in the lease. In nearly every instance the amount of rent paid is less than would be that of office rooms in business blocks. This plan results in further economy to the Government, because the salary paid to an official who is provided with living quarters is less than would be given him if such quarters were not furnished.

The following is a complete list of the buildings owned by the Weather Bureau, with the cost of the land and buildings in each case:

Buildings owned by the Weather Bureau.

Location.	Value of lot.	Value of buildings.	Total value.
Amarillo, Tex	$1,255.00	$6,503.00	$7,758.00
Atlantic City, N. J	(*a*)	6,000.00	6,000.00
Bentonville, Ark	570.40	5,144.50	5,714.90
Bismarck, N. Dak	(*a*)	10,000.00	10,000.00
Block Island, R. I	1,100.00	7,700.00	8,800.00
Burlington, Vt	(*b*)	10,505.95	10,505.95
Cape Henry, Va	(*a*)	9,104.25	9,104.25
Columbia, S. C	3,799.00	9,170.00	12,969.00
Devils Lake, N. Dak	2,300.00	8,000.00	10,300.00
Duluth, Minn	2,100.00	7,900.00	10,000.00
Hatteras, N. C	125.00	4,875.00	5,000.00
Havre, Mont	1,850.00	5,700.00	7,550.00
Jupiter, Fla	(*a*)	6,094.95	6,094.95
Key West, Fla	2,020.00	7,991.75	10,014.75
Kittyhawk, N. C	(*a*)	1,616.00	1,616.00
Modena, Utah	(*a*)	4,346.00	4,346.00
Mount Weather, Va.:			
Observatory building	2,000.00	18,000.00	20,000.00
Power house and balloon building	650.00	8,000.00	8,650.00
Absolute building	(*a*)	6,500.00	6,500.00
Variation building	(*a*)	8,000.00	8,000.00
Kite shelter	(*a*)	3,000.00	3,000.00
Stable	(*a*)	2,000.00	2,000.00
Barn	(*a*)	900.00	900.00
Cottage for workmen	(*a*)	1,300.00	1,300.00
Mount Washington, N. H	(*c*)	300.00	300.00
Nantucket, Mass	1,236.50	3,968.00	5,204.50
Narragansett Pier, R. I	4,100.00	8,000.00	12,100.00
North Head, Wash	(*a*)	4,000.00	4,000.00
North Platte, Nebr	(*d*)	3,818.50	3,818.50
Oklahoma, Okla	(*e*)	10,886.35	10,886.35
Peoria, Ill	54.00	7,915.00	7,969.00
Point Reyes Light, Cal	(*a*)	3,000.00	3,000.00
Port Crescent, Wash	82.00	1,000.00	1,082.00
Sand Key, Fla	(*a*)	5,593.00	5,593.00
Sault Ste. Marie, Mich	(*a*)	3,000.00	3,000.00
Southeast Farallon, Cal	(*a*)	5,211.22	5,211.22
Springfield, Ill	(*a*)	10,602.70	10,602.70
Tatoosh Island, Wash	(*a*)	5,000.00	5,000.00
Washington, D. C	25,000.00	150,000.00	175,000.00
Yellowstone Park, Wyo	(*a*)	11,500.00	11,500.00
Yuma, Ariz	(*a*)	1,500.00	1,500.00
Total	48,241.90	393,649.17	441,891.07

a Government reservation. *b* Donated by University of Vermont. *c* Leased.
d Old building bought. *e* Donated by Epworth University.

Rented buildings occupied wholly by the Weather Bureau.

Station.	Annual rent.	Other items included.
Alpena, Mich	$650.00	Heat, light, water.
Anniston, Ala	475.00	
Charles City, Iowa	420.00	Do.
Del Rio, Tex	444.00	Do.
Durango, Colo	440.00	Heat, cleaner, light, water.
East Clallam, Wash	120.00	Water.
Flagstaff, Ariz	300.00	
Helena, Mont	504.00	Heat, water.
Independence, Cal	432.00	Heat, light, water.
Kalispel, Mont	360.00	
Lewiston, Idaho	540.00	
Manteo, N. C	144.00	
Moorhead, Minn	600.00	Do.
Mount Tamalpais, Cal	420.00	Do.
Pysht, Wash	144.00	Water.
Roseburg, Oreg	550.00	Heat, light, water.
Roswell, N. Mex	720.00	Heat, cleaner, light.
Santa Fe, N. Mex	360.00	
Santo Domingo, West Indies	480.00	
Thomasville, Ga	420.00	
Tonopah, Nev	1,200.00	
Twin, Wash	100.00	
Williston, N. Dak	450.00	Heat, cleaner, light, water.
Winnemucca, Nev	360.00	Heat, light, water.
Iola, Kans	468.00	Do.

Stations at which observers' quarters are furnished by the Government separate from offices.

Station.	Annual rent.	
	Office.	Residence.
Bridgetown, Barbados	$240.00	$240.00
Honolulu, H. I	480.00	540.00

During the fiscal year beginning July 1, 1906, observatory buildings will be constructed at Anniston, Ala.; Birmingham, Ala.; Charles City, Iowa; Iola, Kans.; Mount Weather, Va., cottage and office building; Mount Weather, Va., physical laboratory building[2]; Sandy Hook, N. J.; Sheridan, Wyo.

It is not practicable, however, to state the cost of the grounds and buildings at these places, because, in most instances, the purchase of the ground has not been consummated and the building contracts have not been let.

CHANGES IN THE FORCE OF THE BUREAU.

CLASSIFIED SERVICE.

Appointments.—One hundred and thirteen permanent appointments were made during the fiscal year—by certification for probationary period, 100 (of which number 49 were assistant observers, at $720 per annum), at $360 to $1250 per annum; by transfer from other bureaus, 4, at $1200 to $2000; by reinstatement, 8, at $360 to $1000, and by Executive order, 1, at $3000 per annum.

Temporary and emergency appointments.—There were 37 temporary appointments for periods of less than ninety days, at $360 to $1000, mostly station messenger boys, at $360, whose appointments were made pending the action of the Civil Service Commission to secure eligibles, and 8 emergency appointments, for one to thirty day periods, at $450 to $1000.

All temporary and emergency appointments were made under the authority of the Civil Service Commission.

The total number of appointments of all kinds made during the year was 158.

Promotions.—One hundred and eighty-three promotions were made by advancement to the next higher grade.

Reductions.—Necessitated by the public needs or due to change of station assignment requested by employee, 15; because of decreased efficiency, 5; to eliminate the $1500 and $1300 grades, 22; for neglect of duty, errors, etc., 13; for speculating, in violation of station regulations, 1; for culpable negligence and irregularity in filing practise forecasts, 1; because of allowances of quarters, fuel, and light, 5; total reductions for the year, 62.

Resignations.—Fifty-two voluntary separations occurred, of which 11 were made to enable the employees to accept positions in other Government bureaus. Sixteen resignations were required—1 for refusing station assignment, 1 because of conflicting public and private interests, 3 for incompetency, 6 for unsatisfactory service, 1 for unsatisfactory conduct and service, 3 for unsatisfactory conduct, and 1 for physical disability; total separations by resignation during the year, 68.

Removals.—For neglect of duty and insubordination, 1; for unsatisfactory service, 2; for shiftless habits and personal misconduct, 1; for absence without authority, 2; for flagrant disobedience of orders, 1; because of insanity, 1; for disobedience of instructions and falsification of records, 1; total 9.

Dropt from rolls at termination of probationary period.—Two probationers were refused absolute appointment because of unsatisfactory service.

Deaths.—Total, 6.

UNCLASSIFIED SERVICE.

Appointments.—Appointments to the unclassified service numbered 10, the salaries ranging from $240 to $480 per annum, as follows: For duty at Washington, D. C., 3 (2 thru the board of labor employment and 1 for an emergency period of less than one month); for duty outside the District of Columbia, 7 (1 station agent, 3 student assistants, 3 road laborers).

Promotions.—Four unclassified employees were promoted during the year, each to the next higher grade, the salaries ranging from $360 to $720 per annum.

Resignations.—There was one (voluntary) resignation.

Reductions.—One unclassified employee was reduced for using extraneous influence to secure change of station assignment.

[2] One-half constructed previous year.

Discharges.—Three laborers were discharged as commissioned employees and reemployed as per diem men.

ABSENCES DURING THE CALENDAR YEAR 1905.

Station.—The average absence with pay of station employees (99 per cent being males) during the calendar year 1905 was 1.4 days on account of sickness and 9.1 days on account of annual leave.

Washington, D. C.—The average absence with pay of employees at Washington, D. C. (officials, clerks, mechanics, messengers, and laborers), during the same period was: Males, 3.9 days on account of sickness and 26.1 days on account of annual leave; females, 2.8 days on account of sickness and 27.8 days on account of annual leave.

The general average of the entire service, station and Washington combined, was 2.1 days on account of sickness and 13.8 days on account of annual leave.

STATISTICS OF THE SERVICE.

The following tables show the numerical strength of the Bureau and the highest and lowest salaries paid in the classified and unclassified grades:

Numerical strength of the Weather Bureau, June 30, 1906.

At Washington, D. C.:		
Classified	172	
Unclassified	11	
Outside of Washington, D. C.:		
Classified	496	
Unclassified	17	
		513
Total commissioned employees		*a* 696
Additional employees outside of Washington, D. C.:		
Storm-warning displaymen	164	
River observers	340	
Cotton-region observers	144	
Corn and wheat region observers	133	
Rainfall observers	107	
Sugar and rice region observers	9	
Total noncommissioned employees		897
Total paid employees		*b* 1, 593
Persons serving without compensation (except thru the distribution of Government publications):		
Cooperative observers		*c* 3, 683
Cooperative storm-warning displaymen		*d* 71
Weather correspondents		*e* 4, 841
Total numerical strength		8, 595

Distribution of the commissioned force, June 30, 1906.

In Washington, D. C.:	No. of employees.
Accounts Division	12
Climatological Division	7
Review Room	3
Executive branch	*f* 17
Forecast Division (including River and Flood Service)	13
Division of Ocean Meteorology	7
Instrument Division	10
Library	3
Division of Meteorological Records	17
Miscellaneous Mechanical Work	5
Publications Division	43
Supplies Division	*g* 10
Telegraph Division	11
Captain of the Watch (under direction of the Chief Clerk)	25
Total	183

Outside of Washington, D. C.:	
64 stations with 1 employee	64
50 stations with 2 employees	100
36 stations with 3 employees	108
19 stations with 4 employees	76
12 stations with 5 employees	60
6 stations with 6 employees	36
4 stations with 7 employees	28
3 stations with 8 employees	24
1 station with 9 employees	9
2 stations with 11 employees	22
197 stations	*h* 527

In addition to the above, there are seven one-man stations in the West Indies, in charge of noncommissioned employees (generally agents of cable companies).

Salaries paid in the classified and unclassified grades.

Grades.	June 30, 1906. Station.	June 30, 1906. Washington, D. C.
CLASSIFIED GRADES.		
Highest salary	$3, 000	$5, 000
Lowest salary	360	450
Average salary	986	1, 207
UNCLASSIFIED GRADES.		
Highest salary	720	720
Lowest salary	300	240
Average salary	384	492

Average salary for all (station and Washington, including the Chief of Bureau), $1,028.

The foregoing table of salaries does not include employees on duty at substations (storm-warning displaymen, river observers, etc.) whose compensation ranges from $5 to $20 per month, and whose tour of service averages less than one hour a day; and it does not include seven station agents in the West Indies, each averaging about $25 a month.

RECOMMENDATIONS.

It is recommended that four additional Weather Bureau stations be created and that for this purpose $10,000 be added to the fund "Salaries, Weather Bureau," and also that $10,000 be added to the fund "General Expenses, Weather Bureau," with $5000 additional to provide for the gradual increase of telegraphic expense at the existing stations of the Bureau. Two additional clerks are recommended for duty at the Central Office to perform the additional work entailed upon the Bureau by the creation of new stations and the increasing demands for additional reports.

An appropriation of $22,000 is also recommended for the purchase and the laying of a cable to connect Devils Island, Minnesota, with the mainland.

a This total represents an increase of 16 over the number reported June 30, 1905, and is exclusive of 16 employees on furlough for three months or more on June 30, 1906.

b This total embraces all paid employees in the Bureau on June 30, 1906, including the Chief of Bureau, but excluding employees on furlough for three months or more.

c The 1771 cooperating vessels mentioned under "Ocean Meteorology", and representing a larger number of observers, are not included in these statistics.

d Twenty of these cooperative displaymen are employed in other branches of the Government service.

e About 75 per cent of this number also serve as cooperative observers. This decrease from the report of 1905 is due to dispensing with the services of a large number of weather crop correspondents, rendered unnecessary by the elimination of the crop feature from the weather bulletins.

f Two men devote half their time elsewhere.

g Plus one-half the time of one man.

h This number represents the *normal* regular force. On June 30, 1906, there were actually on duty only 513 employees.

FORECAST DIVISION.

Prof. E. B. GARRIOTT, in charge.

RIVERS AND FLOODS.

The floods that occurred during the year were discust in the Reviews for the appropriate months, and need no further mention here other than the simple statement that they were forecast with the usual timeliness and accuracy over all districts where river and flood service is maintained.

The total number of river forecasting districts has been increased from 47 to 48 by the division of the district of Charleston, S. C., and the assignment of the supervision of the Santee and Edisto watersheds to Columbia, S. C., which was established as a river district center on July 1, 1906. On the same date the supervision of the district of California was transferred from San Francisco to Sacramento, Cal. The total number of stations of observation remains practically the same as during the year 1905, altho quite a number of changes were made during the year. A detailed statement follows:

RIVER STATIONS ESTABLISHED.

Station.	*District.*
Birds Bridge, Tenn	Knoxville, Tenn.
Catawba, S. C	Columbia, S. C.
Denison, Tex	Shreveport, La.
Electra, Cal	Sacramento, Cal.
Firebaugh, Cal	Sacramento, Cal.
Fort Ripley, Minn	Minneapolis, Minn.
Jacksonville, Cal	Sacramento, Cal.
Jenny Lind, Cal	Sacramento, Cal.
Melones, Cal	Sacramento, Cal.
Merced Falls, Cal	Sacramento, Cal.
Merrill, Iowa	Sioux City, Iowa.
Monroeville, Cal	Sacramento, Cal.
Pearl River, La	Meridian, Miss.
Pollasky, Cal	Sacramento, Cal.
Prowers, Colo	Denver, Colo.
Rimini, S. C	Columbia, S. C.
St. John, Cal	Sacramento, Cal.
Salida, Colo	Denver, Colo.

River observations also began on July 1, 1906, at Reno, Nev., in the district of Sacramento, Cal.

The stations were changed from special rainfall to special river at the following places:

Station.	*District.*
Mendota, Va	Knoxville, Tenn.
Newport, Tenn	Knoxville, Tenn.
Pelzer, S. C	Columbia, S. C.
Santa Rosa, N. Mex	Denver, Colo.

At the following stations in the district of Sacramento, Cal., where occasional observations only were taken heretofore, regular daily observations will be taken for seven months of each year:

Colusa, Cal.	Lathrop, Cal.
Folsom City, Cal.	Marysville, Cal. (Yuba River.)
Kennett, Cal.	Oroville, Cal.
Knights Landing, Cal.	Riovista, Cal.

RAINFALL STATIONS ESTABLISHED.

Station.	*District.*
Boonton Dam, N. J. (Cooperative.)	Philadelphia, Pa.
Delta, Cal	Sacramento, Cal.
Downieville, Cal	Sacramento, Cal.
La Porte, Cal	Sacramento, Cal.
Marion, Ohio	Columbus, Ohio.
Prattville, Cal	Sacramento, Cal.
Stony Ford, Cal	Sacramento, Cal.
Weston, Colo	Denver, Colo.

The station at Vincennes, Ind., Cairo, Ill., district, was changed from a special river to a special rainfall station.

RIVER STATIONS DISCONTINUED.

Station.	*District.*
Brookville, Pa	Pittsburg, Pa.
Catlettsburg, Tenn	Knoxville, Tenn.
Coshocton, Ohio	Columbus, Ohio.
Glendive, Mont	Sioux City, Iowa.
Iowa City, Iowa	Keokuk, Iowa.
Musselshell, Mont	Sioux City, Iowa.
Springfield, Ohio	Columbus, Ohio.

RAINFALL STATIONS DISCONTINUED.

Station.	*District.*
Batesville, Miss	Vicksburg, Miss.
Black River Falls, Wis	La Crosse, Wis.
Buckingham, Va	Richmond, Va.
Catawba, N. C	Charleston, S. C.
Dyersburg, Tenn	Memphis, Tenn.
Fayetteville, Ark	Little Rock, Ark.
Gaffney, S. C	Charleston, S. C.
Glasgow, Va	Richmond, Va.
Greeneville, Tenn	Knoxville, Tenn.
Howardsville, Va	Richmond, Va.
Jackman, Me	Portland, Me.
Kenton, Ohio	Columbus, Ohio.
Marion, Kans	Fort Smith, Ark.
Oregon, Ark	Little Rock, Ark.
Peterson, Minn	La Crosse, Wis.
Tercio, Colo	Denver, Colo.
Thornton, N. Mex	Denver, Colo.
Williamsburg, Ky	Nashville, Tenn.

The highest and lowest stages for the year, together with the annual ranges at 256 selected stations, are shown in Table V.—*H. C. Frankenfield, Professor of Meteorology.*

GENERAL CLIMATIC CONDITIONS.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The annual distribution of mean pressure during 1906 over the United States and Canada is graphically shown on Chart VI, and the average values and departures from the normal are shown for each station in Tables I and IV.

The normal annual distribution of atmospheric pressure shows the existence of two well-defined high areas—one over the Ohio Valley, east Gulf, and South Atlantic States, and extending eastward over the Atlantic, with the crest, 30.10 inches or above, east of the Bermudas; while the second high area covers the Pacific between the Hawaiian Islands and the coast of Oregon and northern California, extending eastward into northern California and central Oregon.

During 1906 high pressure covered the greater part of all districts east of the Mississippi Valley, except the Florida Peninsula and New England, and extended in a narrow strip westward over the lower Missouri Valley into the central Rocky Mountain and Plateau districts.

Pressure averaged unusually high over the eastern slope of the Rocky Mountains and in the upper Lake region and northward over the Province of Ontario, where the normal was exceeded from .05 to .07 inch.

In a narrow strip along the coast of southern California and over the greater part of northern California and the western portions of Oregon and Washington, also over the Florida Peninsula, the pressure averaged slightly below normal; otherwise over all districts of the United States and Canada the average for the year was above the normal.

TEMPERATURE.

The year was one of unusual warmth over nearly all districts.

Along the entire northern border from the lower Lakes westward to the Pacific the annual means averaged 2° or more above the normal, and across the border in Manitoba and surrounding districts the average for the year exceeded the normal from 3° to more than 5°.

In the southern portions of Georgia and Alabama and over the Florida Peninsula the temperature averaged slightly below normal, also over western Texas and the greater part of New Mexico, Arizona, and Utah.

The extremes of temperature for the year from all regular stations and from a limited number of cooperative stations in the United States and Canada are shown on Chart IX.

An examination of the chart shows that the extremes of temperature were, as a rule, well within the limits of former years.

Maximum temperatures of 100° or higher were recorded in the upper Missouri Valley, at scattered points in the Gulf States, in central and western Texas, over the southern portions of New Mexico and Arizona, and the central portions of California, Oregon, and Washington.

Minimum temperatures of 30° below zero or lower were confined to portions of northern New England, northern Minnesota, North Dakota, and to the elevated stations of the central Rocky Mountain district.

PRECIPITATION.

The annual precipitation for 1906 is shown on Chart IV. Over the districts east of the Rocky Mountains, lines have been drawn showing approximately the amounts of precipitation over the areas inclosed. Over the western Mountain and Pacific coast districts, on account of the diversified topography and the consequent variations in the annual fall, no attempt has been made to show the annual amounts by isohyetals, and figures representing the actual amounts have been entered at the respective points of observation.

The enormous variations possible in the amounts of fall at points in close proximity are shown on the above-mentioned chart. Over the southern flanks of the Appalachian Mountains, in western North Carolina, and northern Georgia, the precipitation ranged from 75 to nearly 130 inches, while on the opposite slopes scarcely one-half of those amounts was recorded.

Also near the coast of northern Oregon amounts as high as 140 inches fell on the western slopes of the Coast Range, at elevations not above 2500 feet, which were twice the amounts measured at the level of the sea.

The departure of the annual precipitation for 1906 from the normal is shown on Chart XI.

Lines showing the amounts of departure have been drawn where sufficient uniformity existed in the signs, otherwise figures representing the actual departures were entered.

The total precipitation for 1906 was below the normal along the Atlantic coast from Virginia to central Florida, and over the Gulf coast from western Florida to Texas. The deficiency on the immediate coast line was very marked, ranging from more than 12 inches at Hatteras to nearly 20 inches at New Orleans. Precipitation was also deficient over New England, New York, Pennsylvania, the Lake region, central Mississippi, and lower Missouri valleys, and over the north Pacific coast districts.

In marked contrast with the deficiency along the Atlantic and Gulf coasts, the amount of fall over the Appalachian Mountain region from Pennsylvania southward to the central parts of the east Gulf States, and in a narrow strip westward over Alabama, northern Mississippi, central Arkansas, and northern Texas, ranged from 5 to as much as 25 inches above the average.

Precipitation was also in excess over practically all the Great Plains district from central Texas to North Dakota, over the entire Rocky Mountain and Plateau districts, and the Pacific coast from central Oregon to southern California.

The annual fall was especially heavy over central and northern Texas and the central and western portions of Oklahoma, Kansas, and Nebraska, where amounts from 10 to 12 inches above the normal were recorded.

In the central Rocky Mountain States, northern New Mexico, Arizona, Nevada, and central and southern California, the excesses were generally large, altho at isolated points the amounts were less than the average.

The year was one with rainfall in general sufficient for all ordinary requirements, and generally well distributed thru the growing season. An unusual amount of cloudy weather was the rule in nearly all districts, and the relative amount of moisture was generally in excess of the average.

DISTANT EARTHQUAKES RECORDED AT THE WEATHER BUREAU DURING THE YEAR 1906.

By C. F. MARVIN, Professor of Meteorology. Dated March 6, 1907.

This summary gives details of the records of all the earthquakes recorded by the Bosch-Omori seismograph in Washington, D. C., during 1906. In all cases the origin of these disturbances was at least hundreds and in most instances many thousands of miles distant from Washington; in fact, this type of seismograph is adapted to record only the so-called distant earthquakes.

Thus far the Weather Bureau has not maintained seismographs at any station except at Washington, D. C., and no organized effort is made to collect seismic observations. It therefore results that in many cases the origin of the earthquakes recorded is not known and can not be identified, except of course in the few instances where the earthquakes were accompanied by great calamities and are consequently reported in the public press.

The Weather Bureau has maintained some form of seismograph in operation in Washington almost continuously since 1886, but during the earlier years the record is quite incomplete, owing to the imperfect character of the instruments employed and to gaps in the records resulting from the removals of the office of the Weather Bureau, and other causes.

As stated in the MONTHLY WEATHER REVIEW, Vol. XXXI, p. 125, one pendulum of the Bosch-Omori seismograph was installed first during February, 1903. In the early part of 1906 this pendulum was moved to more spacious quarters, where, together with its companion pendulum, it could be installed in a much better and more permanent fashion, and both components of horizontal motion have been recorded continuously since April 22, 1906. The reader is referred to the MONTHLY WEATHER REVIEW, Vol. XXXI, p. 271, and Vol. XXXIV, p. 212, for further particulars in regard to the instruments themselves.

The year 1906 has probably been as notable as any in history for the number and disastrous nature of the great earthquakes that occurred. It is certain that within recent years no similar loss of life and devastation of populous centers of civilization has been recorded. These facts do not in themselves, however, justify a conclusion that there has been a distinct increase in the annual number of earthquakes; it has simply happened that the origin of many of the great seismic disturbances has occurred within thickly populated districts. In this connection it is very important to bear in mind that the secondary effects of earthquakes, such as fire in the one case and great tidal waves in the other, are often immediate causes of vastly greater disasters than the earthquake itself.

On the morning of January 31, 1906, seventy-fifth meridian time, the greatest earthquake thus far recorded on the seismographs at the Weather Bureau occurred in Colombia, South America, and several of the submarine cables in the Caribbean Sea connecting Colombia with the West Indian Islands were severed. This disturbance appears to have been accompanied by a great tidal wave, as shown by some of the press dispatches.

At this date no great earthquake had occurred within the United States since the Charleston earthquake, and it would seem that the horrors of such great disasters were almost forgotten. At any rate, the press of the country contained only a few scanty notices of this severe South American disaster,

and the attention of the people of the United States was not aroused to the fact that a great earthquake had occurred just beyond the borders of their own territory.

A very considerable earthquake was also recorded during the afternoon of April 10 that has not yet been identified, and doubtless occurred far out at sea or remote from populous human habitations. Three days later another great earthquake occurred in the island of Formosa, attended by great losses of life and property, but receiving slight attention from the public generally.

Immediately following these severe seismic convulsions came the great Californian disturbance, namely, on April 18. According to the best information now available the first perceptible tremors occurred at the fault-line, a few miles to the west of San Francisco at 5 h., 12 m., 0 sec., and the strong motion set in about thirty seconds later.

A very full report will be published in the near future by the Carnegie Institution, presenting the results of the investigation of the California earthquake, made by the commission appointed by Governor Pardee for that purpose.

The International Seismological Bureau at Strassburg has undertaken to collect all possible data relating to the Valparaiso earthquake of August 17, 1906, to lay before the delegates at the meeting in the fall of 1907.

It is not within our province, at the present time, to enter upon a discussion of the detailed features of any of these great earthquakes other than those set forth in the accompanying summary.

Summary of earthquakes recorded by the Bosch-Omori seismograph at Washington, D. C., during 1906.

Date.	Component, N.-S. or E.-W.	Seventy-fifth meridian time. First preliminary tremors began.	Second preliminary tremors began.	Principal portion began.	Principal portion ended.	End of earthquake.	Duration of— First preliminary tremors.	Second preliminary tremors.	Principal portion.	Earthquake.	Period of pendulum.	Magnification of record.	Maximum double amplitude of actual displacement of pier.	Remarks.
1906.		*h. m. s.*	*h. m. s.*	*h. m. s.*	*h. m. s.*	*h. m. s.*	*m. s.*	*h. m. s.*	*m. s.*	*h. m. s.*	*Sec.*	*Times.*	*mm.*	
January 2, p. m.	E.-W.	9 — —	....	9 55 56	10 01 06	10 49 06	......	....	5 10	1 * *	21	10	......	Not recorded on N.-S. component.
January 21, a. m.	N.-S.	9 12 40	....	9 38 40	....	10 — —	......	....	......	....	28	10	......	Too small to measure.
	E.-W.	9 12 50	9 21 15	9 35 00	9 48 00	10 51 00	8 25	0 13 45	13 00	1 41 10	23.5	10	0.12	
January 24, a. m.	N.-S.	1 55 27	....	2 01 32	2 09 13	*		0 06 05	7 41	*	28	10	0.19	Primary disturbance.
	E.-W.	1 55 30	....	2 02 48	2 07 48	*	......	0 07 18	5 00	*	26	10	0.30	Do.
	N.-S.	....	....	....	....	....	......	....	......	....	28	10	......	Second disturbance, too indefinite to make out.
	E.-W.	....	....	2 25 32	2 29 22*	....	......	....	3 50	....	26	10	0.10	Do.
	N.-S.	2 34 22	....	2 41 45	2 49 47	3 03 27	......	0 07 23	8 02	0 29 05	28	10	0.12	Third disturbance.
	E.-W.	2 35 17	....	2 43 23	2 50 13	3 07 20	......	0 08 06	6 50	0 32 03	26	10	0.20	Do.
	N.-S.	4 56 37	....	4 59 17	5 01 43	5 33 25	......	0 02 40	2 26	0 36 48	28	10	0.08	Fourth disturbance.
	E.-W.	4 55 30	....	4 59 47	5 01 32	5 31 43	......	0 04 17	1 45	0 36 13	26	10	0.13	Do.
January 25, p. m.	N.-S.	*	....	3 46 40	3 50 00*	3 56 45*	......	....	3 20	....	28	10	0.09	This record very ill-defined.
	E.-W.	3 41 30	....	3 49 05	3 51 10	3 55 00	......	0 07 35	2 05	0 13 30	26	10	0.18	
January 27, a. m.	N.-S.	5 06 42	5 10 30	5 13 27	5 29 32	6 16 37	3 48	0 02 57	16 05	1 09 55	28	10	0.13	
	E.-W.	5 06 28	5 10 08	5 12 00	5 29 30	6 11 30	3 40	0 01 52	17 30	1 05 02	26	10	0.19	
January 31, a. m.	N.-S.	10 43 28	....	10 50 06	11 29 36	2 48 30	......	0 06 38	39 30	4 05 02	30	10	†	Pen left sheet.
	E.-W.	10 43 12	....	10 49 22	11 20 00	2 40 25	......	0 06 10	30 38	3 57 13	25	10	†	Do.
February 18, p. m.	E.-W.	9 26 05	9 37 00	9 59 28	10 13 38	11 21 30	10 55	0 22 28	14 10	1 55 25	51	10	0.40	In room No. 26.
	E.-W.	9 26 22	....	9 59 26	10 14 17	11 15 52	......	0 33 04	14 51	1 49 30	10.6	30	0.10	In room No. 45.
March 3, a. m.	E.-W.	3 47 03	....	3 50 59	3 54 58	5 05 02	......	0 03 56	3 59	1 17 59	51	10	1.55	In room No. 26.
	E.-W.	3 47 01	3 51 05	3 53 42	3 57 14	4 53 32	4 04	0 02 37	3 32	1 06 31	10.6	30	1.80	In room No. 45.
March 10, a. m.	E.-W.	2 34 00	....	2 37 00	2 43 00	3 — —	......	0 03 00	6 00	....	51	10	0.10	In room No. 26.
	E.-W.	2 34 00	....	2 39 00	2 42 00	....	......	0 05 00	3 00	....	11	30	......	New instrument, room No. 45.
March 29, a. m.	E.-W.	4 58 27	....	5 02 17	5 10 00	5 15 00	......	0 03 50	7 43	0 16 33	33	10	0.05	In room No. 26.
April 18, a. m.	E.-W.	8 19 20	8 25 00	8 29 38	8 41 00	12 35 20	5 40	0 04 38	11 22	4 16 00	32	10	40.00*	In room No. 26, San Francisco quake.
April 18, p. m.	N.-S.	7 39 55	....	7 44 45	7 46 10	8 40 —	......	0 04 50	1 25	1 00 —	35	15	7.00	After shock of San Francisco quake.
April 19, a. m.	N.-S.	2 54 00	....	2 59 00	3 05 00	4 04 00	......	0 05 00	6 00	1 10 00	35	15	0.06	
April 23, a. m.	N.-S.	4 22 30	....	4 28 30	4 31 36	5 — —	......	0 06 00	3 06	0 40 *	30	15	0.13	
	E.-W.	4 22 30	....	4 28 16	4 33 00	5 — —*	......	0 05 46	4 44	0 40 *	31	10	0.21	
May 4, p. m.	N.-S.	7 38 43	....	7 46 13	7 56 00	8 30 00	......	0 07 30	9 47	0 51 17	30	15	0.05	
	E.-W.	7 38 43	....	7 46 03	7 54 00	8 39 00	......	0 07 20	7 57	1 00 17	31	10	0.10	
May 31, p. m.	N.-S.	11 53 29	0 10 08	0 33 28	0 45 58	2 15 30	16 39	0 23 20	12 30	2 22 01	30	15	0.71	
June 1, a. m.	E.-W.	11 53 28	....	0 34 35	0 47 33	2 03 28	......	0 41 07	12 58	2 10 00	33	10	0.48	
June 6, p. m.	N.-S.	9 58 21	....	10 01 48	10 07 51	10 58 21	......	0 03 27	6 03	1 — —	30	15	0.07	
	E.-W.	9 53 52	....	10 01 45	10 05 30	10 29 00	......	0 07 53	3 45	0 35 08	30	10	0.10	
June 19, a. m.	N.-S.	7 06 20	....	7 25 05	7 37 00	8 25 00	......	0 18 45	11 55	1 18 40	30	15	0.09	
	E.-W.	7 03 50	7 16 10	7 26 57	7 35 00	8 00 00	12 20	0 10 47	8 03	0 56 10	30	10	0.07	
June 19, p. m.	N.-S.	9 00 00*	9 32 44	9 36 46	9 43 25	10 20 —	......	0 04 02	6 39	1 — —	30	15	0.30	
	E.-W.	9 18 30	9 32 36	9 36 46	9 42 36	10 19 51	4 06	0 04 10	5 50	1 01 21	33	10	0.12	
June 21, p. m.	N.-S.	10 21 40	....	10 27 13	10 33 00*	10 50 —*	......	0 05 33	5 47	0 28 20	30	15	0.07	
	E.-W.	10 20 50	....	10 27 00	10 32 40	10 50 00	......	0 06 10	5 40	0 29 10	32	10	0.05	
	N.-S.	2 — —	....	2 03 35	2 07 00	2 20 —*	......	....	3 25	....	30	15	0.06	
	E.-W.	2 00 03	....	2 03 25	2 06 00	2 15 00	......	0 03 22	2 35	0 14 57	32	10	0.07	
June 22, a. m.	N.-S.	....	....	2 31 —	2 33 —	....	......	....	......	....	32	10	......	Very slight wave movement.
	E.-W.	....	....	2 30 —	2 31 —	....	......	....	......	....	30	15	......	
	N.-S.	2 59 —	....	....	....	3 13 —	......	....	......	....	32	15	......	Too small to define.
	E.-W.	2 57 10*	....	....	....	3 02 50*	......	....	......	....	30	10	......	
June 24, a. m.	N.-S.	6 51 49	....	7 29 14	7 47 20	8 53 14	......	0 37 25	18 06	2 01 25	32	15	0.17	
	E.-W.	6 51 49	....	7 29 34	7 39 14	8 43 36	......	0 37 45	9 40	1 51 47	35	10	0.08	
June 26, a. m.	N.-S.	7 28 54	....	7 32 04	7 34 42	7 52 34	......	0 03 10	2 38	0 23 40	30	15	0.07	
	E.-W.	7 28 50	....	7 31 14	7 33 44	7 52 29	......	0 02 24	2 30	0 23 39	35	10	0.09	
June 27, a. m.	N.-S.	4 00 00	....	....	....	....	......	....	......	....	......	......	......	Details can not be made out.
	E.-W.	4 09 00	....	....	....	....	......	....	......	....	......	......	......	Do.
	N.-S.	4 00 00	....	....	....	....	......	....	......	....	32	15	......	Lines crowded by tilting, record undecipherable.
July 1, p. m.	E.-W.	4 02 12	....	....	....	4 14 12	......	....	......	0 12 00	35	10	......	Slight disturbance of doubtful character.
	N.-S.	9 50 12	....	....	....	10 20 12	......	....	......	0 30 00	32	15	......	Record not clear, second disturbance.
	E.-W.	10 02 27	....	....	....	10 11 12	......	....	......	0 08 45	35	10	......	Record doubtful, second disturbance.
July 2, a. m.	E.-W.	0 00 47	....	0 20 32	0 23 12	0 33 00	......	0 19 45	2 40	0 32 13	35	10	......	Very small, doubtful; no record on N.-S. component.
	E.-W.	6 54 47	....	....	....	7 18 00	......	....	......	0 23 13	35	10	......	Do.
July 8, p. m.	N.-S.	6 00 18	....	6 08 55	6 21 10	6 35 40	......	0 08 37	12 15	0 35 22	32	15	0.05	
	E.-W.	5 59 10	....	6 10 20	6 13 15	6 45 30	......	0 11 10	2 55	0 46 20	35	10	0.05	
July 13, p. m.	N.-S.	6 58 58	....	7 03 07	7 05 58	7 36 00	......	0 04 09	2 51	0 37 02	30	15	0.07	
	E.-W.	6 58 05	....	7 03 12	7 05 27	7 35 37	......	0 05 07	2 15	0 37 32	35	10	0.30	
July 16, p. m.	N.-S.	....	....	4 29 35	4 37 00	— —	......	....	7 25	....	30	15	0.07	
	E.-W.	4 01 —	....	4 26 —	4 32 30	4 56 —	......	0 25 00	6 30*	0 55 —	35	10	0.12	
July 20, a. m.	N.-S.	6 11 55	....	6 39 00	6 42 00	6 59 00	......	0 28 05	3 00	0 47 05	30	15	0.05	Instrument in imperfect order.
	E.-W.	6 11 55	....	6 40 45	6 44 50	6 59 00	......	0 28 50	4 05	0 47 05	35	10	0.10	
July 22, p. m.	E.-W.	2 42 06	....	2 47 26	2 54 24	3 27 35	......	0 05 20	6 58	0 35 29	35	10	0.08	Record on N.-S. component lost by superposed record trace.
August 1, p. m.	N.-S.	....	....	6 56 12	7 09 14	....	......	....	13 02	....	30	15	0.05	
	E.-W.	....	....	6 56 12	7 05 52	....	......	....	9 40	....	35	10	0.04	
August 14, p. m.	E.-W.	....	....	9 02 —	9 13 —	....	......	....	11 —	....	35	10	0.03	Imperfectly recorded on N.-S. component.

Summary of earthquakes recorded by the Bosch-Omori seismograph at Washington, D. C.—Continued.

Date.	Component, N.-S. or E.-W.	Seventy-fifth meridian time. First preliminary tremors began.	Second preliminary tremors began.	Principal portion began.	Principal portion ended.	End of earthquake.	Duration of— First preliminary tremors.	Second preliminary tremors.	Principal portion.	Earthquake.	Period of pendulum.	Magnification of record.	Maximum double amplitude of actual displacement of pier.	Remarks.
1906.		*h. m. s.*	*h. m. s.*	*h. m. s.*	*h. m. s.*	*h. m. s.*	*m. s.*	*h. m. s.*	*m. s.*	*h. m. s.*	*Sec.*	*Times.*	*mm.*	
August 16, p. m....	N.-S.	7 21 22	7 30 42	7 41 50	8 40 22	11 24 00	9 20	0 11 08	58 32	4 02 38	30	15	5.30	Great Valparaiso earthquake.
	E.-W.	7 22 34	7 30 42	7 41 50	8 40 22	11 28 00	8 08	0 11 08	58 32	4 05 26	35	10	5.00	Do.
August 19, a. m....	N.-S.	4 51 21	....	5 11 21	5 24 40	5 44 00		0 20 00	13 19	0 52 39	30	15	0.05	
	E.-W.	4 51 41	....	5 19 32	5 25 41	5 38 36	....	0 27 51	6 09	0 46 55	31	10	0.05	
August 20, a. m....	N.-S.	....	....	5 45 56	5 49 56	6 — —	....	....	4 00	— — —	30	15	0.13	
	E.-W.	....	....	5 45 56	5 49 51	6 — —	....	....	3 35	— — —	35	10	0.05	
August 21, p. m....	N.-S.	....	....	3 58 10	4 04 00	4 — —	....	....	5 50	....	30	15	0.07	
	E.-W.	....	....	3 58 10	4 03 00	4 27 —	....	....	4 50	....	35	10	0.05	
August 23, p. m....	N.-S.	8 58 36	9 08 56	9 14 56	9 18 34	10 08 00	10 20	0 06 00	3 38	1 00 24	30	15	0.12	Clock error uncertain.
	E.-W.	8 56 56	....	9 11 26	9 17 31	10 — —	....	0 14 30	6 05	1 — —	35	10	0.10	Do.
August 25, a. m....	N.-S.	9 11 14	....	9 42 14	9 48 14	10 + +	....	0 31 00	6 00	1 + +	30	15	0.07	Sheet removed before record ended, clock error uncertain.
	E.-W.	9 12 14	9 26 14	9 42 46	9 47 46	10 + +	14 00	0 16 32	5 00	1 + +	35	10	0.10	Do.
August 26, a. m....	N.-S.	1 24 14	1 39 02	2 03 12	2 14 14	3 20 24	14 48	0 24 10	11 02	1 56 10	30	15	0.17	Absolute time uncertain by ± 1 minute.
	E.-W.	1 24 14	1 40 28	2 04 09	2 13 14	3 19 29	16 14	0 23 41	9 05	1 55 15	35	10	0.30	Do.
August 28, a. m....	N.-S.	0 09 55	0 21 00	0 31 10	0 34 35	1 15 40	11 05	0 10 10	3 25	1 05 45	30	15	0.30	Do.
	E.-W.	0 11 00	....	0 32 00	0 36 15	1 — —	....	0 21 00	4 15	1 — —	35	10	0.13	Absolute time uncertain by ± 1 minute, probably 1½ minutes slow.
August 29, p. m....	N.-S.	9 46 45	9 54 38	10 04 45	10 16 20	11 12 00	7 53	0 10 07	11 35	1 25 15	30	15	0.30	Do.
	E.-W.	9 45 00	9 54 40	10 04 40	10 14 00	10 15 00	9 40	0 10 00	9 20	1 30 00	35	10	0.42	
September 7, p. m..	N.-S.	2 — —	2 24 31	2 45 46	3 05 31	4 16 31	— —	0 21 15	19 45	1 52 +	30	15	0.15	Record crowded and uncertain.
	E.-W.	....	2 24 31	2 44 16	2 58 46	4 07 31	— —	0 19 45	14 30	1 43 +	35	10	0.18	Do.
September 14, a. m.	N.-S.	8 30 54	....	8 57 29	9 — —	— — —	....	0 26 35	.....	....	30	15	0.03	Sheet removed and end of record lost.
	E.-W.	8 30 —	....	8 57 29	— — —	....	....	....	....	....	35	10	....	Do.
	N.-S.	11 25 19	11 43 00	11 59 58	12 22 00	1 43 00	17 41	0 16 58	22 02	2 17 41	30	15	0.90	Second shock, large.
	E.-W.	11 25 19	....	11 43 30	12 18 14	1 40 00	....	0 18 11	34 44	2 14 41	35	10	1.62	
September 17, a. m	N.-S.	....	....	4 34 00	5 — —	....	....	....	....	....	30	15	....	Vibration too strong.
	E.-W.	....	....	4 43 00	4 54 40	5 09 —	....	....	11 40	....	35	10	0.10	
September 17, a. m...	E.-W.	....	....	5 31 59	5 42 00	6 — —	....	....	10 01	....	35	10	....	Second shock; N.-S. component can not be made out.
September 20, p. m...	N.-S.	8 57 28	....	9 04 28	9 10 28	9 30 —	....	0 07 00	6 00	0 32 +	30	15	0.07	E.-W. component can not be made out.
September 28, a. m..	N.-S.	10 34 24	....	10 38 24	10 46 34	11 30 00	....	0 04 00	8 10	0 55 36	30	15	0.90	
	E.-W.	10 38 22	....	10 42 04	10 46 24	11 24 00	....	0 03 42	4 20	0 45 38	35	10	0.50	
October 1, p. m....	N.-S.	9 05 23	9 24 38	9 48 43	10 19 00	‡	19 15	0 24 05	30 17	3 + +	30	15	0.30	Record of earthquake near Australia.
	E.-W.	9 04 23	9 24 23	9 51 38	10 24 23	0 20 00	20 00	0 27 15	32 45	3 15 37	35	10	0.20	Do.
October 2, a m.....	N.-S.	9 29 53	9 56 38	10 19 53	10 27 00	11 16 00	26 45	0 23 15	7 07	1 40 07	30	15	0.15	
	E.-W.	9 31 23	....	10 20 00	10 27 00	11 — —	....	0 48 37	7 00	1 30 —	35	10	0.12	Record confused by superposition.
October 17, a. m....	N.-S.	5 36 00	....	5 55 24	6 01 —	6 20 —	....	0 19 24	5 36	0 44 —	20	15	0.06	
	E.-W.	5 36 00	....	5 55 15	5 56 30	6 08 —	....	0 19 15	1 15	0 32 —	20	20	0.04	
October 24, a. m....	N.-S.	— — —	....	10 41 47	10 47 27	11 19 —	....	....	5 40	....	20	15	0.20	Record began just after changing sheets; beginning obscured.
	E.-W.	— — —	....	10 36 10	10 45 37	11 15 —	....	....	9 27	....	20	20	0.05	Do.
October 28, p. m......	E.-W.	8 53 06	....	8 58 16	8 58 36	9 15 —	....	0 05 10	0 20	0 22 —	20	20	0.05	Record on N.-S. component not well defined.
October 30, p. m......	N.-S.	....	....	9 35 —	9 45 —	....	....	....	10 —	....	20	15	....	No record on E.-W. component.
November 14, p. m.	N.-S.	1 04 37	1 20 57	1 34 52	1 40 32	2 56 —	16 20	0 13 55	5 40	1 51 —	20	15	0.24	
	E.-W.	1 03 17	....	1 34 32	1 44 57	2 58 —	....	0 31 15	10 25	1 54 —	20	20	0.23	
November 19, a. m.	N.-S.	2 39 03	....	3 47 12	4 00 42	4 55 —	....	1 08 09	13 30	2 15 —	20	15	0.43	
	E.-W.	2 38 17	....	3 46 17	4 05 17	4 48 —	....	1 08 00	19 00	2 09 —	20	20	0.11	
November 28, a. m.	N.-S.	4 20 46	4 32 00	4 39 16	4 43 12	5 10 —	11 14	0 07 16	3 56	0 49 —	20	15	......	
	E.-W.	4 20 46	....	....	....	....	....	....	....	....	....	....	......	Principal portion undefined.
December 3, p. m...	N.-S.	6 05 06	....	6 00 36	6 13 31	6 58 —	....	0 04 30	3 55	0 52 —	20	15	0.35	Record of apparently nearby quake.
	E.-W.	6 05 06	....	6 00 41	6 12 41	6 59 —	....	0 04 35	3 00	0 53 —	20	20	0.17	Sharply recorded.
December 8, p. m...	N.-S.	....	....	4 35 10	4 38 00	5 — —	....	....	2 50	....	20	25	0.08	Small quake disturbed by other influences.
	E.-W.	....	....	4 34 16	4 39 00	5 — —	....	....	4 44	....	20	20	0.04	Only principal portion can be made out.
December 18, p. m..	N.-S.	....	....	9 10 —	9 13 —	....	....	....	3 —	....	20	25	0.02	Very slight; pendulum strongly damped.
	E.-W.	8 45 20	....	9 10 58	9 13 50	9 36 —	....	0 25 38	2 52	0 50 —	20	20	0.30	
December 20, a. m...	....	....	....	....	....	....	....	....	....	....	....	....	......	Clock stopt 1:50 a. m.; evidence of small disturbance.
December 23, p. m..	N.-S.	12 37 35	12 41 20	12 46 20	12 54 15	1 21 20	3 45	0 05 00	7 55	0 43 45	20	25	1.52	Large disturbance; well recorded.
	E.-W.	12 37 35	12 41 20	12 46 50	12 56 30	1 16 20	3 45	0 05 30	9 40	0 38 45	20	20	2.20	Good record of large quake comparatively near by.

* Doubtful. † Very great. ‡ October 2, a. m., indefinite. § In this and similar cases, when the beginning of the second preliminary tremors was not sharply defined, then the total duration of the preliminary tremors is given in the column for the second preliminary tremors. In this table 0 is used for midnight and 12 for noon.

TABLE I.—*Annual climatological summary, Weather Bureau stations, 1906.*

Districts and stations.	Elevation of barometer above sea level.	Pressure in inches.*			Temperature of the air, in degrees Fahrenheit.							Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation.			Winds.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall, inches.†
		Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean max.+mean min.÷2	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Annual range.			Total, in inches.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Max. velocity. Miles, per hour.	Max. velocity. Direction.					
New England.					47.5	+0.4							76	41.45	− 1.81									5.6	
Eastport	76	29.91	29.99	+.02	42.0	+0.5	85	49	−10	35	95	35	80	39.49	− 5.69	136	100,967	nw.	65	e.	96	117	152	6.2	92.4
Portland, Me	103	29.91	30.03	+.03	44.9	−0.8	93	52	− 5	38	98	36	74	42.54	+ 0.28	122	80,554	nw.	44	ne.	117	105	143	5.5	94.2
Concord	288	29.72	30.04	+.02	45.8	−0.2	93	56	−11	36	104	......	......	33.28	− 6.99	112	46,608	nw.	30	nw.	168	91	106	4.5	53.6
Northfield	876	29.09	30.06	+.05	40.7	−0.5	90	52	−22	30	112	34	80	34.75	+ 0.24	135	67,172	s.	44	nw.	95	111	159	6.2	89.2
Boston	125	29.90	30.04	+.03	50.0	+1.4	93	58	− 1	42	94	40	72	40.69	− 4.27	130	88,369	sw.	41	e.	124	107	134	5.4	37.6
Nantucket	12	30.02	30.03	+.01	49.7	+0.9	85	56	7	44	78	43	82	44.92	+ 4.19	142	141,295	sw.	67	ne.	110	135	120	5.8	22.4
Block Island	26	30.01	30.04	+.02	50.0	+0.9	83	56	5	44	78	43	81	38.55	− 5.64	125	151,880	sw.	62	nw.	104	150	111	5.4	16.5
Providence	160	29.87	30.04	+.02	49.9	− 0.1	92	59	0	41	92	40	73	41.34	......	126	61,233	nw.	34	e.	127	118	120	5.3	33.3
Hartford	159	29.88	30.05	+.03	50.0	+1.0	93	59	0	41	93	40	73	43.96	......	125	61,026	s.	37	sw.	83	131	151	6.3	35.2
New Haven	106	29.93	30.05	+.02	50.8	+1.4	92	59	2	42	90	41	78	51.30	+ 3.39	123	81,388	ne.	41	n.	129	116	120	5.2	35.7
Middle Atlantic States.					53.7	+1.0							74	43.82	+ 1.30									5.7	
Albany	97	29.96	30.06	+.03	48.6	+0.4	93	58	−10	40	163	39	74	32.51	− 5.35	126	65,854	s.	38	e.	96	135	134	5.7	44.1
Binghamton	875	29.12	30.06	+.02	47.6	+1.0	92	57	−12	39	104	......	......	32.07	− 2.25	138	51,570	w.	33	sw.	85	76	204	6.7	34.5
New York	314	29.71	30.05	+.01	53.5	+1.8	93	60	5	47	88	44	73	41.82	− 2.98	121	109,185	nw.	64	w.	110	121	134	5.6	22.1
Harrisburg	374	29.67	30.08	+.03	52.9	+1.4	94	61	4	45	90	42	70	34.21	− 9.85	123	62,567	w.	44	w.	100	117	148	5.7	32.6
Philadelphia	117	29.94	30.07	+.02	55.3	+1.9	96	63	8	48	88	44	68	51.87	+12.03	138	90,324	nw.	54	nw.	97	116	152	6.0	20.5
Scranton	805	29.19	30.06	+.02	50.0	......	92	59	− 9	41	101	40	74	35.46	......	154	62,344	sw.	40	w.	93	120	152	6.0	49.7
Atlantic City	52	30.01	30.07	+.03	53.5	+1.6	96	60	8	47	88	46	77	48.80	+ 6.09	136	78,085	sw.	36	ne.	83	106	176	6.8	12.6
Baltimore	123	29.93	30.07	+.02	56.0	+0.8	96	64	8	48	88	44	68	46.82	+ 2.87	134	67,581	nw.	46	w.	90	101	174	6.3	24.3
Washington	112	29.95	30.07	+.01	55.4	+0.7	95	65	7	47	88	45	74	52.92	+ 9.46	143	55,544	nw.	38	w.	132	121	112	5.3	25.7
Lynchburg	681	29.33	30.08	+.01	57.5	+0.6	96	67	13	48	83	48	76	42.63	− 0.22	132	37,513	ne.	29	nw.	132	139	94	5.2	15.4
Mount Weather	1,725	28.24	30.08	+.02	50.2	......	88	58	0	43	88	41	76	51.80	......	144	139,763	nw.	73	nw.	132	111	122	5.3	34.4
Norfolk	91	29.98	30.08	+.03	60.2	+1.2	96	68	16	53	80	51	77	49.23	− 2.85	144	84,297	s.	49	sw.	142	93	130	5.2	7.9
Richmond	144	29.93	30.09	+.03	58.5	−0.1	98	68	12	49	86	......	......	46.80	+ 2.71	134	75,324	s.	51	s.	134	127	104	4.8	15.4
Wytheville	2,293	27.70	30.08	+.01	53.2	+0.6	88	63	6	44	82	45	82	46.55	+ 5.94	165	47,644	w.	35	w.	127	123	115	5.1	19.7
South Atlantic States.					63.1	+0.4							78	47.19	− 4.90									5.0	
Asheville	2,255	27.73	30.09	+.02	55.4	+0.5	89	65	7	45	82	47	81	45.33	+ 1.88	148	67,243	se.	38	nw.	111	139	115	5.4	18.6
Charlotte	773	29.25	30.09	+.02	60.5	+0.6	98	69	17	52	81	49	73	47.66	− 4.26	145	62,461	ne.	38	w.	113	117	135	5.5	3.0
Hatteras	11	30.06	30.07	+.01	62.9	+1.5	89	69	20	57	69	57	85	53.94	−12.47	118	132,457	sw.	59	n.	189	91	85	4.2	0.2
Raleigh	376	29.68	30.08	+.02	60.8	+1.7	97	70	15	51	82	49	72	43.34	− 2.75	136	59,905	sw.	32	nw.	136	112	117	5.0	5.0
Wilmington	78	29.98	30.06	.00	63.5	+0.5	96	72	20	55	76	54	78	48.99	− 5.35	122	71,231	sw.	50	ne.	122	160	83	4.7	0.1
Charleston	48	30.02	30.07	.00	66.0	+0.2	97	73	22	59	75	57	79	43.62	−13.12	118	96,770	s.	64	n.	136	140	89	4.8	
Columbia, S. C.	351	29.69	30.08	+.01	63.5	−0.2	96	73	17	54	79	52	74	48.54	+ 0.99	130	60,025	ne.	44	ne.	124	112	129	5.5	T.
Augusta	180	29.88	30.07	.00	63.6	−0.3	98	72	20	55	78	53	74	53.91	+ 5.59	119	56,654	ne.	38	sw.	127	123	115	5.1	T.
Savannah	65	30.00	30.08	+.02	66.5	+0.1	96	75	22	58	74	56	78	39.67	−12.24	119	67,402	sw.	42	n.	128	131	106	5.1	
Jacksonville	43	30.00	30.05	−.01	68.5	−0.5	96	76	24	61	72	60	81	46.86	− 7.26	108	83,023	se.	48	s.	130	136	99	5.0	
Florida Peninsula.					74.4	−0.2							80	50.74	+ 6.12									4.7	
Jupiter	28	30.00	30.03	.00	73.7	+0.1	91	80	30	68	61	67	82	70.85	+11.28	143	102,847	se.	60	ne.	73	233	59	5.2	
Key West	22	29.99	30.01	−.01	76.4	−0.7	91	81	47	72	44	68	78	48.53	+10.07	131	90,735	ne.	56	nw.	146	145	74	4.7	
Tampa	35	30.00	30.04	.00	71.5	−0.1	95	80	28	63	67	62	80	51.83	− 2.98	122	70,272	ne.	39	sw.	171	113	81	4.4	
East Gulf States.					65.1	+0.1							75	54.20	− 0.04									5.3	
Atlanta	1,174	28.84	30.07	.00	61.1	−0.1	93	70	16	53	77	50	72	53.65	+ 3.27	124	105,139	nw	54	nw.	127	111	127	5.3	5.2
Macon	370	29.68	30.08	+.02	64.9	+1.1	100	75	20	55	80	......	......	43.72	− 0.19	120	42,189	ne.	34	sw.	119	139	107	5.3	2.4
Thomasville	273	29.78	30.07	+.01	66.8	−0.5	99	78	22	56	77	......	......	54.64	+ 1.39	118	47,384	ne.	34	s.	151	130	84	4.6	
Pensacola	56	30.00	30.06	+.01	67.5	−0.1	96	74	26	61	70	......	......	47.05	−10.04	100	87,841	ne.	83	e.	131	122	112	5.1	
Anniston	741	29.30	30.09	+.03	61.8	+0.9	96	73	16	51	80	......	......	70.83	+21.66	137	46,870	se.	36	n.	107	93	165	6.1	1.5
Birmingham	700	29.33	30.09	+.03	63.1	−1.1	96	72	19	55	77	......	......	64.74	+ 7.87	127	68,111	ne.	50	se.	77	142	146	6.1	T.
Mobile	57	29.99	30.05	.00	67.3	+0.6	97	75	27	59	70	57	76	53.15	− 9.46	116	60,875	n.	55	e.	120	161	84	4.9	
Montgomery	223	29.83	30.08	+.02	65.1	−0.1	96	75	22	55	74	54	76	50.13	− 2.59	116	57,495	se.	37	nw.	145	128	92	4.7	T.
Meridian	375	29.67	30.06	.00	63.8	+0.1	95	74	22	54	73	......	......	64.92	+10.45	111	46,132	sw.	44	ne.	139	116	110	5.1	
Vicksburg	247	29.78	30.06	.00	65.4	+0.1	96	74	24	56	72	54	74	51.76	− 3.90	112	56,615	se.	38	w.	130	136	99	5.0	1.6
New Orleans	51	30.00	30.05	+.01	69.2	+0.4	95	77	30	62	65	60	79	41.59	−18.93	106	74,626	ne.	50	n.	92	146	127	5.6	
West Gulf States.					65.7	0.0							75	33.38	− 8.05									5.0	
Shreveport	249	29.79	30.06	+.03	65.3	+0.1	96	75	21	56	75	53	72	34.35	−14.25	101	58,646	se.	40	ne.	163	103	99	4.7	1.8
Fort Smith	457	29.56	30.04	+.01	60.3	+0.5	97	70	10	51	87	49	72	42.50	− 2.24	112	72,354	e.	50	w.	123	142	100	4.8	9.7
Little Rock	357	29.68	30.06	+.02	61.5	0.0	95	70	13	53	82	50	71	47.06	− 6.57	107	65,209	nw.	50	nw.	117	101	147	5.6	6.0
Corpus Christi	20	30.00	30.02	+.03	70.3	+0.2	96	76	30	64	66	63	81	26.46	− 3.74	69	91,552	se.	62	n.	143	124	98	4.7	
Fort Worth	670	29.33	30.04	+.03	64.1	−0.6	99	74	13	54	86	......	......	35.95	+ 2.77	85	91,527	s.	48	se.	175	138	52	4.0	3.3
Galveston	54	29.99	30.05	+.02	69.5	−0.3	95	74	30	65	65	63	84	31.16	−17.52	77	97,231	se.	49	nw.	129	143	93	5.0	T.
Palestine	510	29.50	30.03	+.01	65.3	+0.1	94	74	21	56	73	54	75	32.94	−13.57	103	64,462	s.	37	ne.	93	119	153	6.1	2.4
San Antonio	701	29.28	30.00	+.01	68.4	−0.1	102	79	24	58	78	55	69	20.42	− 9.28	90	61,363	se.	39	se.	143	130	92	4.7	T.
Taylor	583	29.41	30.02	+.02	66.4	......	100	77	21	56	79	......	......	29.58	......	84	75,320	s.	36	nw.	138	115	112	5.0	T.
Ohio Valley and Tenn.					56.1	+0.5							74	42.46	− 3.03									5.8	
Chattanooga	762	29.28	30.10	+.03	60.5	+0.6	94	70	17	51	77	49	72	47.58	− 5.32	148	57,577	w.	50	w.	120	*123	122	5.5	5.7
Knoxville	1,004	29.02	30.08	+.01	58.8	+1.6	93	68	13	49	80	48	75	43.16	− 7.83	149	63,092	sw.	44	sw.	94	130	141	5.9	1.2
Memphis	399	29.66	30.08	+.03	61.1	0.0	93	69	13	53	80	52	75	54.31	+ 1.03	111	76,293	sw.	60	nw.	138	113	114	5.0	1.0
Nashville	546	29.51	30.09	+.03	59.6	+0.3	95	69	10	50	85	48	71	49.48	− 0.62	131	52,261	sw.	34	se.	108	92	165	5.9	1.7
Lexington	989	29.01	30.09	+.03	54.5	− 0.6	90	63	0	46	90	......	......	42.59	− 1.79	150	91,343	sw.	52	nw.	127	101	137	5.5	26.4
Louisville	525	29.50	30.09	+.03	57.2	+0.5	96	66	− 1	48	97	46	72	42.06	− 3.70	134	73,251	sw.	54	sw.	109	122	134	5.6	17.4
Evansville	431	29.59	30.06	+.01	57.0	......	94	65	0	49	94	......	......	44.24	......	120	63,599	s.	50	s.	116	162	87	5.1	19.8
Indianapolis	822	29.18	30.07	+.03	53.1	+0.4	92	62	− 2	44	94	44	75	37.47	− 5.49	133	85,444	ne.	58	sw.	89	125	151	6.1	38.6
Cincinnati	628	29.40	30.08	+.02	55.4	+0.3	94	64	0	47	94	44	68	40.83	+ 0.96	147	60,225	ne.	42	sw.	98	122	145	5.9	29.2
Columbus	824	29.19	30.07	+.02	52.7	+0.6	94	62	− 3	44	97	42	72	33.70	− 5.19	184	89,966	se.	60	w.	95	121	149	5.9	35.7
Pittsburg	842	29.16	30.07	+.02	52.8	−0.1	90	62	− 3	44	93	43	73	31.29	− 5.39	163	86,012	nw.	66	w.	84	110	171	6.5	30.5
Parkersburg	638	29.42	30.08	+.02	54.8	+0.4	94	64	0	45	94	45	76	36.23	− 4.61	154	50,647	s.	43	nw.	116	113	136	5.6	29.1
Elkins	1,940	28.03	30.10	+.04	51.6	+1.9	88	62	− 8	41	96	43	81	49.09	+ 1.62	179	35,296	w.	32	s.	87	107	171	6.3	43.7
Lower Lake Region.					49.0	+1.0							75	33.48	− 2.35									6.0	
Buffalo	767	29.21	30.04	+.02	47.8	+1.3	88	55	− 2	41	90	40	78	33.63	− 4.41	166	120,797	sw.	76	sw.	75	141	149	6.3	53.4
Oswego	335	29.67	30.04	+.02	46.7	+0.3	89	54	− 9	39	98	40	80	36.23	+ 1.21	154	92,342	s.	48	sw.	104	77	184	6.2	56.4
Rochester	523	29.48	30.06	+.04	48.6	+1.8	93	57	− 3	40	96	39	74	29.74	− 5.08	145	73,778	sw.	48	w.	97	91	177	6.3	44.3
Syracuse	597	29.41	30.06	+.03	47.3	......	90	55	−17	39	107	......	......	36.49	......	151	94,199	s.	58	s.	79	151	135	6.0	59.4
Erie	713	29.27	30.05	+.02	49.3	+0.6	90	56	− 2	42	92	40	71	34.82	− 6.46	155	98,036	w.	48	s.	102	120	143	5.9	32.1
Cleveland	762	29.23	30.06	+.02	50.0	+1.1	88	57	− 1	43	89	41	74	31.62	− 4.67	174	130,449	se.	60	w.	84	132	149	6.2	52.9
Sandusky	629	29.37	30.06	+.02	50.9	+0.9	95	58	3	44	92	......	......	34.83	− 0.08	132	73,252	sw.	42	n.	110	101	154	5.6	21.1
Toledo	628	29.38	30.06	+.03	50.4	+0.8	93	59	− 1	42	94	41	74	30.27	− 0.66	134	102,747	sw.	68	sw.	139	101	125	5.2	18.1
Detroit	730	29.26	30.06	+.03	49.6	+1.5	94	58	− 2	42	96	41	76	33.67	+ 1.34	134	96,618	sw.	52	sw.	107	102	156	5.9	29.4
Upper Lake Region.					44.8	+1.8							77	31.21	− 1.55									5.9	
Alpena	609	29.37	30.05	+.04	43.8	+2.5	93	52	−10	35	103	37	81	35.22	+ 0.14	142	89,894	nw.	46	se.	104	140	121	5.6	60.1
Escanaba	612	29.38	30.05	+.04	42.2	+2.0	86	50	−11	34	97	35	76	31.70	− 0.76	135	84,212	n.	46	w.	126	121	118	5.3	72.5
Grand Haven	632	29.35	30.04	+.02	47.3	+1.0	89	55	− 7	40	96	40	78	29.82	− 4.95	132	99,477	se.	64	sw.	84	133	148	6.1	35.7
Grand Rapids	707	29.28	30.05	+.03	48.7	+0.7	94	57	− 6	40	100	40	76	28.89	− 4.93	134	93,144	nw.	66	sw.	70	116	179	6.6	20.0
Houghton	668	29.30	30.04	+.04	41.7	......	93	50	−20	33	113	......	......	32.58	......	165	60,249	e.	36	nw.	96	113	156	6.1	118.8
Marquette	734	29.23	30.05	+.05	42.3	+1.8	92	50	− 5	35	97	34	75	37.49	+ 5.12	162	90,676	nw.	48	s.	83	112	170	6.4	141.0
Port Huron	638	29.35	30.05	+.03	47.3	+2.1	92	55	− 6	39	98	40	78	27.33	− 4.27	140	97,610	sw.	52	nw.	112	103	150	5.8	34.6
Sault Ste. Marie	614	29.85	30.06	+.06	40.7	+1.7	88	49	−28	32	116	34	80	23.71	− 5.82	139	74,189	nw.	44	nw.	95	94	176	6.4	60.1
Chicago	823	29.16	30.06	+.03	51.1	+2.8	93	57	6	45	87	43	76	30.87	− 3.89	122	127,128	sw.	59	sw.	102	128	135	5.7	20.6
Milwaukee	681	29.32	30.07	+.05	47.9	+2.9	92	55	− 1	41	93	40	78	30.18	− 1.88	115	92,286	w.	55	se.	148	89	128	5.0	42.6

TABLE I.—*Annual climatological summary, Weather Bureau stations, 1906*—Continued.

Districts and stations.	Elevation of barometer above sea level.	Pressure in inches.* Actual, reduced to mean of 24 hours.	Pressure: Sea level, reduced to mean of 24 hours.	Pressure: Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max.+mean min.÷2.	Temperature: Departure from normal.	Temperature: Maximum.	Temperature: Mean maximum.	Temperature: Minimum.	Temperature: Mean minimum.	Temperature: Annual range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation: Total, in inches.	Precipitation: Departure from normal.	Precipitation: Days with .01, or more.	Winds: Total movement, miles.	Winds: Prevailing direction.	Winds: Max. velocity: Miles, per hour.	Winds: Max. velocity: Direction.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall, inches.†
Upper Lake Region—Con.																									
Green Bay	617	29.36	30.03	+.02	45.2	+1.8	93	54	−10	37	103	37	75	37.90	+ 6.40	125	88,902	sw.	50	n.	96	81	188	6.4	47.3
Duluth	1,133	28.79	30.03	+.02	39.0	+0.6	89	47	−22	31	111	32	79	28.78	− 2.23	134	121,325	ne.	56	ne.	113	126	126	5.3	47.1
North Dakota.					**39.5**	**+1.8**							**76**	**19.90**	**+ 1.04**									**5.4**	
Moorhead	940	29.01	30.05	+.04	40.0	+2.4	93	50	−31	30	124	34	84	26.00	+ 2.23	124	76,101	nw.	40	sw.	125	96	144	5.4	45.9
Bismarck	1,674	28.23	30.05	+.05	40.9	+1.3	102	52	−28	30	130	30	69	18.22	− 0.16	90	96,181	nw.	60	nw.	144	119	102	5.1	23.3
Devils Lake	1,482	28.42	30.02	+.02	37.6	......	103	50	−30	25	123	29	75	15.49	....	88	113,359	se.	56	w.	119	76	160	5.6	25.5
Upper Miss. Valley.					**50.2**	**+0.8**							**75**	**33.31**	**− 0.84**									**5.6**	
Minneapolis	......	......	......	......	45.0	+0.7	93	53	−17	37	110	....	....	35.14	....	112	108,160	w.	52	nw.	87	113	165	6.1	45.2
St. Paul	837	29.11	30.03	+.02	45.1	+1.8	93	54	−17	36	110	36	74	33.21	+ 5.74	109	91,526	se.	50	nw.	78	148	139	6.4	28.2
La Crosse	714	29.26	30.04	+.02	47.2	+1.2	93	56	−15	39	108	....	....	37.75	+ 7.07	121	63,830	s.	38	nw.	121	96	148	5.8	40.3
Madison	974	28.98	30.04	+.02	46.6	+0.9	89	55	− 8	38	97	38	76	32.38	+ 0.47	119	86,961	nw.	54	ne.	118	105	142	5.5	37.8
Charles City	1,015	28.95	30.05	+.03	45.2	−1.4	92	55	−22	36	114	39	83	37.19	+ 6.64	116	67,848	se.	40	nw.	84	110	171	6.3	45.1
Davenport	606	29.38	30.05	+.02	50.9	+1.7	94	60	0	42	94	41	73	27.93	− 5.79	115	66,015	nw.	40	nw.	135	107	123	5.3	21.4
Des Moines	861	29.14	30.06	+.04	49.8	+1.3	97	59	−12	40	109	40	72	29.44	− 3.67	107	72,550	nw.	36	sw.	96	149	120	5.8	44.4
Dubuque	698	29.31	30.07	+.05	48.7	+1.1	92	58	−14	40	106	40	76	28.60	− 6.93	122	60,498	nw.	36	nw.	143	107	115	5.2	32.2
Keokuk	614	29.39	30.08	+.05	52.6	+1.2	97	62	0	44	97	42	73	25.01	− 9.71	91	65,852	sw.	50	sw.	165[a]	95[a]	104[a]	4.6	21.2
Cairo	356	29.69	30.07	+.02	57.9	+0.2	92	66	3	50	89	49	78	46.92	+ 4.09	117	77,250	s.	52	sw.	87	129	149	6.1	6.0
La Salle	536	29.49	30.07	+.04	50.7	......	95	60	2	41	93	....	....	32.25	....	107	69,266	w.	48	sw.	139	100	126	5.2	19.4
Peoria	609	29.40	30.07	+.04	51.1	......	95	61	2	41	93	....	....	29.05	....	111	77,481	s.	53	s.	166	96	103	4.8	17.9
Springfield, Ill	644	29.36	30.06	+.02	53.2	+0.9	96	63	0	44	96	42	72	35.49	− 2.52	114	78,444	s.	40	sw.	112	120	133	5.5	36.3
Hannibal	534	29.48	30.05	+.02	53.0	+0.5	97	62	0	44	97	....	....	33.48	+ 0.10	112	80,577	sw.	48	sw.	132	96	137	5.4	34.4
St. Louis	567	29.44	30.05	+.01	55.6	0.0	93	64	5	48	88	44	71	35.52	− 5.56	106	91,795	s.	60	nw.	133	100	132	5.3	38.4
Missouri Valley.					**50.3**	**+0.9**							**71**	**30.66**	**+ 1.77**									**5.3**	
Columbia, Mo	784	29.21	30.05	+.02	53.9	−1.1	95	64	− 3	44	98	....	....	32.23	− 4.45	112	72,172	s.	48	nw.	167	86	112	4.7	40.8
Kansas City	963	29.04	30.08	+.04	55.0	+1.8	94	64	0	46	94	43	69	32.85	− 3.49	108	66,932	nw.	43	nw.	137	133	95	4.7	23.4
Springfield, Mo	1,324	28.64	30.05	+.02	54.9	0.0	89	64	− 3	46	92	45	75	47.39	+ 2.34	122	91,544	se.	45	sw.	154	103	108	4.8	21.0
Topeka	......	......	......	......	54.5	+0.7	96	65	2	44	94	....	....	24.49	− 8.99	104	77,223	s.	58	nw.	147	122	96	4.6	18.0
Lincoln	1,189	28.76	30.03	+.02	51.5	+1.4	98	62	− 5	41	103	40	70	34.08	+ 7.32	101	93,811	s.	60	nw.	124	121	120	5.4	34.6
Omaha	1,105	28.85	30.05	+.03	51.1	+1.5	97	60	− 8	42	105	38	67	27.59	− 4.10	97	77,833	s.	52	n.	96	112	157	6.1	29.7
Valentine	2,598	27.30	30.04	+.04	46.5	+0.2	99	58	−18	34	117	34	70	26.54	+ 7.39	101	95,321	nw.	68	nw.	147	145	73	4.5	49.9
Sioux City	1,135	28.81	30.04	+.02	47.8	+0.8	96	57	−14	38	110	....	....	31.41	+ 6.46	98	113,301	nw.	58	nw.	116	101	148	5.7	29.9
Pierre	1,572	28.35	30.04	+.04	47.0	+1.6	104	58	−20	36	124	34	69	22.06	+ 6.29	87	68,233	se.	53	sw.	132	118	115	5.1	32.6
Huron	1,306	28.63	30.05	+.04	44.0	+1.7	98	55	−26	33	124	35	76	25.37	+ 4.34	101	104,322	se.	48	s.	140	120	105	5.1	25.4
Yankton	1,233	28.69	30.03	+.02	47.3	+1.6	99	58	−14	37	113	....	....	33.21	+ 6.39	99	74,768	nw.	48	nw.	100	74	191	6.4	27.5
Northern Slope.					**44.4**	**+0.9**							**65**	**17.31**	**+ 3.76**									**4.8**	
Havre	2,505	27.33	30.00	+.03	43.0	+1.9	103	55	−24	31	127	32	72	14.13	+ 0.04	84	77,256	nw.	74	w.	152	135	78	4.7	14.3
Miles City	2,371	27.48	30.06	+.07	46.8	+2.6	106	59	−17	35	123	32	65	16.61	+ 3.90	107	53,410	s.	48	w.	156	127	82	4.4	21.2
Helena	4,110	25.81	30.04	+.03	44.3	+1.2	97	55	−20	34	117	30	64	14.28	+ 1.10	105	58,252	sw.	50	sw.	116	113	136	5.6	49.9
Kalispell	2,962	26.93	30.01	+.02	44.4	......	96	56	−10	33	106	32	69	13.50	....	119	41,092	w.	30	sw.	132	101	132	5.4	46.2
Rapid City	3,234	26.60	30.05	+.06	46.0	0.0	97	58	−15	34	112	35	71	19.85	+ 3.14	89	56,423	w.	50	w.	186	68	111	4.4	22.5
Cheyenne	6,088	24.01	30.01	+.04	44.1	0.0	88	57	−17	32	105	30	63	17.65	+ 5.45	101	89,268	nw.	60	nw.	149	116	100	4.7	54.4
Lander	5,372	24.65	30.05	+.05	42.1	−0.3	94	56	−24	28	118	29	68	16.67	+ 3.00	74	30,232	sw.	46	sw.	119	179	67	4.6	91.2
Yellowstone Park	6,200	23.88	30.05	+.04	39.2	......	87	51	−24	28	111	25	64	15.10	....	143	67,761	sw.	44	sw.	112	145	108	5.3	110.6
North Platte	2,821	27.08	30.05	+.06	49.0	+1.1	97	62	− 8	36	105	37	74	27.99	+ 9.72	102	69,501	se.	59	se.	185	94	86	3.9	39.9
Middle Slope.					**53.6**	**+0.2**							**67**	**24.32**	**+ 2.17**									**4.7**	
Denver	5,291	24.74	30.01	+.05	49.9	+0.5	95	63	− 5	37	100	31	57	16.84	+ 2.35	86	65,243	s.	52	n.	157	127	81	4.5	54.2
Pueblo	4,685	25.29	29.98	+.03	51.4	+0.3	96	65	− 9	37	105	32	56	11.00	− 1.11	70	62,232	nw.	55	w.	187	132	46	3.6	22.8
Concordia	1,398	28.56	30.05	+.04	53.3	+1.1	98	64	0	43	98	41	72	19.91	− 5.89	93	62,446	s.	37	se.	129	143	93	5.0	20.6
Dodge	2,509	27.42	30.03	+.05	53.5	+0.4	96	66	− 1	41	97	42	74	32.54	+12.70	86	89,627	se.	52	se.	125	166	74	5.0	13.5
Wichita	1,358	28.62	30.06	+.05	55.5	+0.1	96	66	1	45	95	44	70	31.00	+ 1.39	100	77,451	s.	39	nw.	121	150	94	5.1	11.5
Oklahoma	1,214	28.74	30.02	+.02	58.2	−1.2	95	68	5	48	90	47	73	34.66	+ 3.58	100	127,544	s.	60	nw.	138	108	119	4.9	3.0
Southern Slope.					**44.1**	**−0.1**							**67**	**24.13**	**+ 2.57**									**4.6**	
Abilene	1,738	28.22	30.02	+.04	62.8	−0.6	102	74	14	52	88	48	68	29.05	+ 4.89	77	73,730	s.	52	w.	93	160	112	5.5	1.3
Amarillo	3,676	26.27	30.00	+.04	55.4	+0.6	100	68	4	43	96	41	69	24.92	+ 3.36	84	96,398	se.	60	nw.	216	74	75	3.5	12.9
Del Rio	944	29.00	29.98	+.02	68.2	......	104	80	17	56	87	....	....	27.33	....	86	71,781	se.	40	w.	136	137	92	5.0	T.
Roswell	3,578	26.33	29.95	+.02	58.3	−0.3	101	73	− 6	43	107	40	63	15.21	− 0.55	70	53,834	s.	42	nw.	149	142	74	4.6	15.6
Southern Plateau.					**59.7**	**−0.1**							**51**	**13.65**	**+ 2.36**									**3.2**	
El Paso	3,762	26.18	29.92	+.03	63.3	−0.1	102	76	12	50	90	37	49	14.99	+ 5.66	65	90,416	e.	52	ne.	195	121	49	3.4	12.3
Santa Fe	7,013	23.27	29.96	+.03	48.5	+0.2	87	60	0	37	87	29	54	16.60	+ 2.35	103	66,811	ne.	53	se.	199	134	32	3.4	23.0
Flagstaff	6,907	23.36	29.92	+.01	45.1	−0.7	88	59	−20	31	108	29	62	22.70	− 0.26	93	63,579	sw.	44	sw.	167	100	98	4.4	63.8
Phoenix	1,108	28.75	29.89	+.01	69.7	+0.5	112	83	24	56	88	40	42	8.55	+ 1.62	34	38,417	e.	35	w.	205	119	41	3.2	
Yuma	141	29.75	29.90	+.02	71.7	−0.5	111	85	28	58	83	46	47	5.40	+ 2.43	25	51,165	n.	41	w.	297	51	17	1.4	
Middle Plateau.					**49.6**	**+0.2**							**58**	**16.06**	**+ 5.31**									**4.5**	
Reno	4,532	25.47	29.99	.00	50.5	+1.3	98	64	9	37	89	33	60	11.05	+ 4.32	70	50,550	w.	58	sw.	193	104	68	3.6	16.2
Winnemucca	4,344	25.62	30.02	+.01	48.8	+0.2	97	63	− 4	34	101	30	58	10.50	+ 2.02	78	58,000	ne.	54	se.	163	78	108	4.5	41.7
Modena	5,479	24.61	29.88	+.03	47.8	−0.2	94	61	− 8	34	102	30	57	19.08	+11.12	88	89,156	w.	60	sw.	137	137	91	4.8	30.1
Salt Lake City	4,366	25.62	30.00	+.01	51.1	−0.2	96	61	7	42	89	33	56	21.28	+ 5.09	104	51,680	se.	66	nw.	140	87	138	5.3	61.3
Durango	6,546	23.66	29.97	+.03	46.8	−0.3	90	61	−13	33	103	30	62	22.85	+ 6.18	111	49,709	nw.	42	s.	149	129	87	4.6	49.7
Grand Junction	4,608	25.39	29.97	+.01	52.7	+0.3	99	65	1	40	98	33	55	11.61	+ 3.11	79	39,645	nw.	35	nw.	172	109	84	4.4	15.4
Northern Plateau.					**50.6**	**+1.3**							**62**	**16.18**	**+ 0.55**									**5.2**	
Baker City	3,471	26.46	30.06	+.02	46.0	+1.1	97	57	− 8	35	105	31	63	13.56	− 1.59	108	57,146	s.	36	sw.	154	101	110	4.8	.....
Boise	2,739	27.18	30.05	+.01	51.5	+0.9	102	62	5	41	97	83	57	14.19	− 0.23	103	50,951	se.	48	nw.	134	103	128	5.3	32.0
Lewiston	757	29.21	30.02	−.01	54.4	+0.8	107	65	7	44	100	....	....	14.43	+ 0.53	100	48,758	e.	50	w.	115	100	150	5.8	9.0
Pocatello	4,477	25.50	30.04	+.02	47.4	+1.8	96	58	−12	37	108	30	59	18.17	+ 2.90	101	76,857	se.	44	sw.	160	135	70	4.2	60.2
Spokane	1,929	27.97	30.03	+.01	49.4	+1.6	99	59	7	40	92	34	64	17.60	− 0.65	113	52,675	sw.	36	sw.	91	91	183	6.4	27.8
Walla Walla	1,000	28.95	30.03	−.01	54.9	+1.7	108	65	10	45	98	42	66	19.13	+ 2.36	100	51,113	s.	40	sw.	161	110	94	4.9	16.4
N. Pac. Coast Region.					**51.5**	**+1.2**							**79**	**45.39**	**− 5.56**									**6.5**	
North Head	211	29.81	30.04	.00	50.8	+0.5	97	55	24	47	73	47	87	55.87	− 6.40	197	145,836	nw.	94	se.	85	99	181	6.5	2.4
Port Crescent	259	29.74	30.02	+.01	47.2	+0.6	84	54	17	40	67	....	....	40.38	− 5.90	161	47,763	nw.	60	ne.	83	103	179	6.4	16.6
Seattle	123	29.92	30.05	+.03	52.5	+1.0	95	59	24	46	71	43	75	36.67	+ 0.77	149	69,741	se.	63	s.	71	135	159	6.6	4.7
Takoma	213	29.80	30.02	−.01	51.8	+2.0	98	60	20	44	78	....	....	42.10	− 2.53	158	49,471	n.	46	sw.	72	90	203	6.7	2.4
Tatoosh Island	86	29.91	30.00	.00	49.4	+1.0	70	53	29	46	41	44	85	69.20	−23.38	202	136,301	e.	86	sw.	55	73	237	7.6	6.8
Portland, Oreg	153	29.87	30.03	−.02	54.4	+1.9	101	62	22	46	79	44	78	43.29	− 3.54	157	51,481	nw.	38	s.	95	96	174	6.3	4.0
Roseburg	510	29.48	30.04	−.02	54.1	+1.4	103	65	20	43	83	45	77	30.21	− 4.95	144	27,239	nw.	30	sw.	119	99	147	5.5	8.9
Mid. Pac. Coast Region.					**57.6**	**+0.6**							**70**	**35.97**	**+ 5.50**									**4.5**	
Eureka	62	29.90	30.06	−.01	52.4	+1.0	77	58	31	47	46	47	83	41.06	− 4.71	128	60,293	n.	45	sw.	86	117	162	6.0	1.8
Mount Tamalpais	2,375	27.55	30.02	−.01	56.1	......	93	62	30	50	63	39	61	31.36	....	82	156,981	nw.	75	nw.	180	81	104	4.1	0.3
Red Bluff	332	29.62	29.97	−.04	62.9	+0.4	110	74	30	52	80	44	60	40.37	+14.26	88	51,287	se.	40	n.	192	45	128	4.3	T.
Sacramento	69	29.91	29.98	−.01	60.4	+0.6	104	71	30	50	74	47	66	30.70	+ 9.83	79	73,846	s.	52	se.	228	43	94	3.4	.....
San Francisco	155	......	......	......	56.2	+0.4	86	63	40	50	46	48	79	26.34	+ 2.63	88	....	w.	....	......	137[1]	113[1]	106[1]	4.8	.....
S. Pac. Coast Region.					**61.7**	**+0.8**							**70**	**21.13**	**+ 6.54**									**3.7**	
Fresno	330	29.63	29.98	+.01	63.2	+0.2	111	76	27	51	84	43	58	16.06	+ 7.06	63	47,826	nw.	36	s.	237	52	76	3.2	.....
Los Angeles	338	29.62	29.98	.00	62.9	+1.5	105	73	34	53	71	49	70	21.46	+ 4.16	61	46,652	w.	36	sw.	168	98	99	4.4	.....
San Diego	87	29.87	29.96	−.02	61.6	+0.9	91	68	35	55	56	52	75	14.90	+ 4.39	61	52,071	nw.	38	w.	252	50	63	3.3	.....
San Luis Obispo	201	29.80	30.02	.00	59.2	+0.5	100	70	26	48	74	46	72	32.09	+10.57	72	46,290	nw.	27	se.	213	75	77	3.8	.....

* Pressure reduced to standard gravity and to the mean of 24 hourly observations. † For the snow year, July 1, 1905, to June 30, 1906. [a] One day missing. [1] Nine days missing.

TABLE II.—*Wind resultants, from observations at 8 a. m. and 8 p. m., daily, during the year 1906.*

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
New England.						
Eastport, Me	228	257	92	305	s. 82 w.	212
Portland, Me	267	225	88	303	n. 79 w.	220
Concord, N. H. †	169	77	80	129	n. 28 w.	104
Northfield, Vt	264	356	72	164	s. 45 w.	130
Boston, Mass	236	203	138	319	n. 80 w.	183
Nantucket, Mass	223	238	178	273	s. 81 w.	96
Block Island, R. I	225	238	169	296	s. 64 w.	30
Providence, R. I	262	179	145	317	n. 64 w.	192
Hartford, Conn	315	255	83	200	n. 63 w.	131
New Haven, Conn	303	214	152	236	n. 44 w.	122
Middle Atlantic States.						
Albany, N. Y	283	275	112	199	n. 85 w.	88
Binghamton, N. Y. †	122	60	133	120	n. 12 e.	63
New York, N. Y	244	192	179	275	n. 62 w.	109
Harrisburg, Pa	226	151	223	268	n. 31 w.	88
Philadelphia, Pa	286	207	163	259	n. 50 w.	124
Scranton, Pa	283	215	178	252	n. 48 w.	100
Atlantic City, N. J	245	217	164	286	n. 78 w.	124
Cape May, N. J	257	240	167	213	n. 70 w.	49
Baltimore, Md	264	178	161	284	n. 55 w.	151
Washington, D. C	298	214	160	221	n. 36 w.	103
Lynchburg, Va	237	217	234	238	n. 11 w.	20
Mount Weather, Va	261	206	167	308	n. 68 w.	150
Norfolk, Va	225	300	191	162	s. 21 e.	80
Richmond, Va	272	281	168	137	s. 74 e.	32
Wytheville, Va	152	121	192	381	n. 81 w.	192
South Atlantic States.						
Asheville, N. C	266	270	200	178	s. 80 e.	22
Charlotte, N. C	222	262	227	205	s. 29 e.	46
Hatteras, N. C	250	228	172	258	n. 76 w.	89
Raleigh, N. C	266	240	129	259	n. 79 w.	132
Wilmington, N. C	236	234	163	273	n. 89 w.	110
Charleston, S. C	200	274	208	184	s. 18 e.	78
Columbia, S. C	233	239	213	218	s. 59 w.	6
Augusta, Ga	220	230	215	232	s. 60 w.	20
Savannah, Ga	210	251	172	254	s. 64 w.	92
Jacksonville, Fla	228	245	254	185	s. 23 e.	71
Florida Peninsula.						
Jupiter, Fla	185	265	257	197	s. 37 e.	100
Key West, Fla	255	133	423	81	n. 71 e.	365
Tampa, Fla	318	120	306	184	n. 32 e.	233
Eastern Gulf States.						
Atlanta, Ga	201	177	250	279	n. 50 w.	38
Macon, Ga. †	140	111	91	108	n. 30 w.	34
Pensacola, Fla. †	182	59	117	90	n. 12 e.	126
Anniston, Ala	227	292	237	116	s. 61 e.	137
Mobile, Ala	318	229	155	169	n. 9 w.	89
Montgomery, Ala	215	229	240	204	s. 69 e.	39
Vicksburg, Miss	228	247	254	159	s. 79 e.	97
New Orleans, La	250	240	231	165	n. 81 e.	67
Western Gulf States.						
Shreveport, La	217	261	242	175	s. 56 e.	80
Fort Smith, Ark	160	149	375	147	n. 88 e.	230
Little Rock, Ark	268	218	194	217	n. 25 w.	55
Corpus Christi, Tex	185	310	347	66	s. 66 e.	309
Fort Worth, Tex	194	304	221	177	s. 22 e.	120
Galveston, Tex	180	310	298	108	s. 56 e.	230
Palestine, Tex	228	299	225	133	s. 52 e.	117
San Antonio, Tex	224	258	355	77	s. 83 e.	280
Taylor, Tex. †	119	149	84	75	s. 17 e.	31
Ohio Valley and Tennessee.						
Chattanooga, Tenn	235	221	171	265	n. 82 w.	95
Knoxville, Tenn	275	206	169	274	n. 57 w.	126
Memphis, Tenn	255	250	219	165	n. 85 e.	55
Nashville, Tenn	242	201	181	265	n. 65 w.	93
Lexington, Ky. †	81	147	116	107	s. 8 e.	67
Louisville, Ky	238	273	152	216	s. 62 w.	73
Evansville, Ind. †	126	118	113	91	n. 70 e.	23
Indianapolis, Ind	242	249	203	217	s. 63 w.	16
Cincinnati, Ohio	217	212	260	238	n. 77 e.	28
Columbus, Ohio	197	241	229	228	s. 1 e.	44
Pittsburg, Pa	287	187	160	289	n. 52 w.	163
Parkersburg, W. Va	230	245	169	220	s. 74 w.	53
Elkins, W. Va	219	223	134	270	s. 88 w.	136
Lower Lake Region.						
Buffalo, N. Y	164	372	176	276	s. 25 w.	232
Oswego, N. Y	191	315	160	205	s. 20 w.	131
Rochester, N. Y	153	253	145	343	s. 63 w.	222
Syracuse, N. Y	158	279	144	267	s. 46 w.	172
Erie, Pa	166	243	173	291	s. 56 w.	140
Cleveland, Ohio	198	297	223	191	s. 18 e.	104
Sandusky, Ohio †	65	140	82	165	s. 48 w.	57
Toledo, Ohio	175	230	198	286	s. 58 w.	103
Detroit, Mich	204	212	191	271	s. 84 w.	80
Upper Lake Region.						
Alpena, Mich	229	218	169	298	n. 85 w.	130
Escanaba, Mich	284	238	152	218	n. 55 w.	80
Grand Haven, Mich	204	238	233	223	s. 16 e.	35
Grand Rapids, Mich	208	215	210	249	s. 80 w.	40
Houghton, Mich. †	89	55	172	114	n. 60 e.	67
Marquette, Mich	230	220	132	304	n. 87 w.	172
Port Huron, Mich	218	270	186	230	s. 40 w.	68
Sault Ste. Marie, Mich	201	177	259	270	n. 25 w.	26
Chicago, Ill	200	232	187	281	s. 71 w.	99
Milwaukee, Wis	233	202	150	287	n. 77 w.	140
Green Bay, Wis	216	283	178	236	s. 41 w.	89
Duluth, Minn	292	129	200	305	n. 32 w.	194

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
North Dakota.						
Moorhead, Minn	281	266	183	184	n. 4 w.	15
Bismarck, N. Dak	275	216	249	307	n. 45 w.	82
Devils Lake, N. Dak	211	231	205	258	s. 70 w.	57
Upper Mississippi Valley.						
Minneapolis, Minn. *	101	114	97	137	s. 72 w.	42
Madison, Wis	198	218	170	252	s. 76 w.	84
Charles City, Iowa	228	240	204	215	s. 43 w.	16
St. Paul, Minn	247	256	198	192	s. 34 e.	11
La Crosse, Wis. †	113	168	50	85	s. 37 w.	59
Davenport, Iowa	235	192	209	260	n. 50 w.	67
Des Moines, Iowa	223	267	180	231	s. 49 w.	67
Dubuque, Iowa	227	262	184	238	s. 56 w.	65
Keokuk, Iowa	218	267	194	237	s. 41 w.	65
Cairo, Ill	252	266	189	194	s. 20 w.	15
La Salle, Ill. †	103	97	122	133	n. 61 w.	12
Peoria, Ill	218	257	184	181	s. 4 w.	39
Springfield, Ill	203	274	184	230	s. 32 w.	84
Hannibal, Mo. †	102	120	86	150	s. 74 w.	66
St. Louis, Mo	201	263	233	191	s. 34 e.	75
Missouri Valley.						
Columbia, Mo. *	101	129	117	93	s. 41 e.	37
Kansas City, Mo	208	295	232	201	s. 19 e.	92
Springfield, Mo	202	298	238	161	s. 38 e.	123
Iola, Kans. †	106	153	94	95	s. 1 w.	47
Topeka, Kans. *	106	143	88	86	s. 3 e.	37
Lincoln, Nebr	256	293	199	140	s. 58 e.	70
Omaha, Nebr	255	283	155	181	s. 43 w.	38
Valentine, Nebr	273	247	134	263	n. 78 w.	132
Sioux City, Iowa †	124	140	107	93	s. 41 e.	21
Pierre, S. Dak	239	230	270	211	n. 81 e.	59
Huron, S. Dak	261	244	204	189	n. 42 e.	23
Yankton, S. Dak. †	96	109	91	152	s. 78 w.	63
Northern Slope.						
Havre, Mont	204	124	207	346	n. 60 w.	161
Miles City, Mont	219	233	210	214	s. 16 w.	15
Helena, Mont	161	240	76	428	s. 77 w.	361
Kalispell, Mont	164	154	113	433	n. 88 w.	320
Rapid City, S. Dak	241	141	177	324	n. 55 w.	179
Cheyenne, Wyo	310	190	84	315	n. 62 w.	260
Lander, Wyo	215	247	190	254	s. 63 w.	72
Yellowstone Park, Wyo	153	406	33	313	s. 48 w.	377
North Platte, Nebr	212	244	229	222	s. 12 e.	33
Middle Slope.						
Denver, Colo	258	295	146	156	s. 15 w.	38
Pueblo, Colo	273	138	248	250	n. 1 w.	135
Concordia, Kans	205	312	169	158	s. 6 e.	109
Dodge, Kans	216	276	248	154	s. 57 e.	111
Wichita, Kans	247	298	221	127	s. 62 e.	107
Oklahoma, Okla	233	355	141	103	s. 60 e.	44
Southern Slope.						
Abilene, Tex	198	377	160	121	s. 13 e.	184
Del Rio, Tex †	83	89	210	67	s. 88 e.	144
Roswell, N. Mex	220	285	156	200	s. 34 w.	78
Southern Plateau.						
El Paso, Tex	222	75	281	315	n. 13 w.	151
Santa Fe, N. Mex	272	198	307	177	n. 60 e.	149
Flagstaff, Ariz	249	177	154	317	n. 66 w.	179
Phoenix, Ariz	120	128	336	266	s. 83 e.	70
Yuma, Ariz	237	202	180	254	n. 65 w.	82
Middle Plateau.						
Reno, Nev	111	213	133	417	s. 70 w.	304
Winnemucca, Nev	281	161	232	272	n. 18 w.	126
Modena, Utah	108	176	176	406	s. 73 w.	240
Salt Lake City, Utah	218	251	268	184	s. 68 e.	90
Durango, Colo	321	142	73	378	n. 65 w.	416
Grand Junction, Colo	120	170	242	264	s. 24 w.	55
Northern Plateau.						
Baker City, Oreg	182	393	115	177	s. 16 w.	218
Boise, Idaho	217	221	232	252	s. 79 w.	20
Lewiston, Idaho †	31	73	258	50	s. 79 e.	214
Pocatello, Idaho	70	321	264	248	s. 3 e.	250
Spokane, Wash	180	286	216	205	s. 6 e.	107
Walla Walla, Wash	103	418	149	188	s. 7 w.	318
North Pacific Coast Region.						
North Head, Wash	232	216	233	230	n. 11 e.	16
Port Crescent, Wash. *	109	94	116	144	n. 62 w.	32
Seattle, Wash	225	268	233	148	s. 63 e.	95
Tacoma, Wash	268	261	76	258	n. 88 w.	182
Tatoosh Island, Wash	40	288	255	238	s. 4 e.	249
Portland, Oreg	229	241	177	287	s. 82 w.	91
Roseburg, Oreg	282	194	179	227	n. 29 w.	100
Middle Pacific Coast Region.						
Eureka, Cal	239	265	147	235	s. 73 w.	92
Mount Tamalpais, Cal	283	141	91	390	n. 64 w.	331
Red Bluff, Cal	283	265	175	205	n. 75 w.	31
Sacramento, Cal	166	389	223	100	s. 29 e.	254
San Francisco, Cal	153	150	67	470	n. 89 w.	403
Southeast Farallon, Cal. *	173	77	23	204	n. 62 w.	204
South Pacific Coast Region.						
Fresno, Cal	377	113	121	294	n. 46 w.	238
Los Angeles, Cal	154	169	211	338	s. 83 w.	127
San Diego, Cal	290	142	140	340	n. 64 w.	223
San Luis Obispo, Cal	336	154	88	281	n. 47 w.	265
West Indies						
San Juan, Porto Rico	75	228	522	25	s. 73 e.	520

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE III.—*Total number of days with thunderstorms at selected stations, 1906.*

State and station.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Alabama.													
Anniston	1	1	5	3	8	12	19	20	14	1	0	0	84
Birmingham	1	1	4	3	8	10	12	14	11	1	1	0	66
Mobile	2	3	6	1	6	14	19	16	16	2	1	1	87
Montgomery	3	3	5	0	6	11	11	10	12	1	2	0	64
Scottsboro	0	1	0	4	6	4	13	6	6	0	0	0	40
Arizona.													
Flagstaff	0	2	2	2	5	0	23	19	6	1	1	0	61
Phoenix	0	0	1	1	1	0	11	9	0	0	0	0	23
Pinto	0	0	0	3	0	0	8	7	3	0	0	0	21
Yuma	0	0	0	0	1	0	3	0	0	0	0	0	4
Arkansas.													
Bentonville	0	0	4	6	7	14	10	14	8	0	3	1	67
Little Rock	2	2	2	4	7	11	11	12	9	0	3	3	66
Fort Smith	3	1	6	7	9	12	9	18	8	0	3	1	77
California.													
Eureka	1	1	1	0	0	0	0	0	0	0	0	0	3
Fresno	0	3	0	0	0	0	0	0	0	0	0	0	3
Independence	0	0	0	1	1	0	15	4	0	0	0	0	21
Los Angeles	0	0	1	2	0	0	1	0	1	0	0	0	5
Mount Tamalpais	0	0	0	0	0	0	0	0	0	0	0	1	1
Point Reyes Light	0	0	0	0	0	0	0	0	0	0	0	1	1
Red Bluff	0	1	0	0	0	0	1	0	1	0	0	1	4
Sacramento	0	1	3	0	0	1	0	0	1	0	0	0	6
San Diego	0	0	0	1	0	0	0	1	0	0	0	1	3
San Francisco	0	0	0	0	0	0	0	0	0	0	0	0	0
San Luis Obispo	0	0	1	0	1	0	2	0	0	0	0	0	4
Southeast Farallon	0	0	0	0	0	0	0	0	0	0	0	0	0
Colorado.													
Denver	0	0	1	0	7	8	9	12	5	0	0	0	42
Durango	0	0	0	3	5	1	14	8	5	0	0	1	37
Grand Junction	0	0	0	2	5	2	12	10	6	0	0	0	37
Pueblo	0	0	1	4	6	12	17	8	7	0	0	0	55
Connecticut													
Hartford	0	0	0	2	3	6	9	8	3	1	0	0	32
New Haven	0	0	0	2	3	8	11	5	4	1	1	0	35
District of Columbia.													
Washington	0	1	1	4	5	9	11	11	4	0	0	0	46
Florida.													
Jacksonville	1	0	1	2	4	17	18	14	6	3	0	0	66
Jupiter	1	1	2	4	10	8	15	15	4	5	1	0	66
Key West	2	3	2	1	6	5	13	18	9	3	2	0	64
Merritt Island	1	1	1	5	15	19	25	18	9	6	0	0	100
Myers	1	0	0	4	12	30	30	30	16	6	0	0	129
Pensacola	3	2	7	1	5	14	20	16	17	3	1	0	89
Sand Key	6	2	3	5	8	7	15	21	11	5	2	0	85
Tampa	2	0	1	2	12	18	27	19	11	2	0	0	94
Georgia.													
Atlanta	1	0	2	2	2	13	14	20	13	0	0	0	67
Augusta	1	0	0	4	5	12	13	16	8	0	1	1	61
Macon	1	0	1	3	2	10	7	9	4	0	0	0	37
Savannah	1	0	3	2	7	15	17	11	9	1	0	1	67
Thomasville	3	1	6	3	6	17	22	16	11	3	0	0	88
Idaho.													
Boise	0	0	1	1	6	5	2	4	0	0	0	1	20
Chesterfield	0	0	0	0	2	2	3	10	0	0	1	0	18
Lewiston	0	0	0	0	5	0	3	3	0	0	0	0	11
Murray	0	0	0	1	2	1	4	3	0	0	0	0	11
Pocatello	0	0	1	1	2	3	4	9	3	0	1	0	24
Illinois.													
Cairo	2	1	2	5	7	10	10	16	7	0	4	2	66
Chicago	2	2	0	3	3	7	4	7	4	0	0	0	32
Cisne	1	1	1	3	2	4	6	3	1	1	1	2	26
Galva	0	0	0	1	2	4	4	7	1	0	0	0	19
La Salle	1	0	1	4	7	5	7	14	4	0	0	0	43
Peoria	1	0	0	6	8	9	9	13	2	0	0	0	48
Rantoul	2	1	0	3	6	0	8	12	3	2	0	0	37
Springfield	1	0	0	5	9	6	8	10	4	1	1	1	46
Indiana.													
Butlerville	1	0	0	3	4	4	8	6	3	0	2	0	31
Cambridge City	1	0	0	3	4	...	...	...	...	...	...	...	...
Evansville	1	1	2	2	6	6	8	13	5	1	2	4	51
Indianapolis	1	0	0	3	6	7	8	10	5	1	0	0	41
Iowa.													
Charles City	0	0	0	1	10	5	9	10	8	0	0	0	43
Davenport	2	0	2	3	11	7	7	10	5	1	0	0	48
Des Moines	0	0	2	3	10	8	11	10	6	1	0	0	51
Dubuque	0	0	1	2	10	9	8	10	5	1	0	0	46
Keokuk	1	0	2	1	8	8	12	12	4	2	0	0	50
Sioux City	0	0	0	3	7	7	10	8	7	1	1	0	44
Kansas.													
Concordia	0	0	3	7	6	8	8	6	5	0	0	0	43
Dodge	0	0	0	3	7	9	6	6	4	0	0	0	35
Iola	0	1	2	4	11	10	8	7	7	0	0	0	50
Topeka	1	0	3	4	6	8	8	11	5	0	1	0	47
Wichita	0	0	3	6	10	10	13	11	8	2	0	0	63
Kentucky.													
Lexington	1	1	1	4	5	9	8	14	10	0	2	0	55
Louisville	1	1	2	5	6	7	11	12	6	0	3	1	55
Louisiana.													
New Orleans	3	1	5	3	3	12	13	15	12	1	1	0	69
Shreveport	2	0	3	3	8	8	10	11	6	0	2	0	53
Maine.													
Eastport	0	0	0	0	3	2	4	4	0	0	0	0	13
Farmington	0	0	0	0	1	3	2	6	1	0	0	0	13
Orono	0	0	0	0	3	3	2	1	0	2	0	0	11
Portland	0	0	0	1	2	6	7	3	1	2	0	0	22
Maryland.													
Baltimore	0	2	1	3	3	8	9	6	1	0	0	0	33
Grantsville	0	0	0	4	4	10	6	0	3	1	0	0	28
Princess Anne	0	1	1	2	3	18	5	4	1	1	2	0	33
Massachusetts.													
Boston	0	0	0	0	4	4	4	6	2	1	0	0	21

TABLE III.—*Total number of days with thunderstorms, etc.*—Continued.

State and station.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Massachusetts—Con.													
Monson	0	0	0	0	2	5	5	4	0	0	0	0	16
Nantucket	0	0	0	1	2	5	4	4	5	1	1	0	23
Michigan.													
Alpena	0	0	0	2	9	10	6	8	5	0	0	0	40
Detroit	0	2	0	4	3	7	10	9	1	2	1	0	39
Escanaba	0	0	0	0	4	6	7	7	5	2	0	0	31
Grand Haven	0	1	0	3	8	5	7	8	3	0	0	0	35
Grand Rapids	0	1	0	3	11	8	8	8	2	1	0	0	42
Houghton	0	0	0	1	4	4	3	5	2	0	0	0	19
Marquette	0	0	0	1	4	7	6	6	3	0	0	0	27
Port Huron	0	1	0	3	6	9	8	9	1	2	0	0	39
Sault Ste. Marie	0	0	0	1	3	5	2	3	4	0	0	0	18
Minnesota.													
Collegeville	0	0	0	1	9	8	4	1	2	0	0	0	25
Duluth	0	0	0	1	7	8	6	6	2	0	0	0	30
Minneapolis	0	0	0	3	9	5	8	7	7	0	0	0	39
Moorhead	0	0	0	1	8	6	7	2	2	1	1	0	28
St. Paul	0	0	0	2	10	5	9	5	6	0	0	0	37
Mississippi.													
Biloxi	2	1	3	2	4	6	7	7	7	2	1	0	42
Meridian	1	1	6	4	7	10	11	10	4	1	0	0	55
Vicksburg	2	1	5	3	5	8	9	12	11	0	2	0	58
Missouri.													
Columbia	1	2	2	5	8	7	5	12	7	1	1	1	52
Hannibal	0	1	1	7	9	9	7	5	5	1	1	1	47
Kansas City	1	2	2	5	9	8	9	12	9	6	1	0	64
St. Louis	1	2	1	5	8	7	6	10	4	0	1	0	45
Springfield	1	1	3	5	10	11	11	11	7	1	1	0	62
Montana.													
Havre	0	0	0	0	1	6	3	5	0	0	0	0	15
Helena	1	0	1	1	7	8	7	9	0	0	1	0	35
Kalispell	0	0	0	0	2	2	7	3	0	0	0	0	14
Miles City	0	0	0	0	6	7	5	8	0	0	0	0	26
Ovando	0	0	0	2	0	2	0	0	0	0	0	0	4
Renova	0	0	0	1	2	0	3	2	0	0	0	0	8
Nebraska.													
Lincoln	0	0	1	8	5	7	9	9	5	0	0	0	44
North Platte	0	0	1	6	8	7	7	8	8	1	0	0	46
Omaha	0	0	1	8	9	12	9	6	7	4	1	1	58
Valentine	0	0	0	4	11	4	8	11	7	0	0	0	45
Nevada.													
Carson City	0	0	0	2	4	2	8	5	2	0	0	0	23
Morey	0	0	0	2	1	0	1	2	0	0	0	0	6
Reno	0	0	0	1	2	2	10	3	1	0	0	0	19
Winnemucca	0	0	1	1	1	1	4	5	0	0	0	0	13
New Hampshire.													
Concord	0	0	0	0	5	6	9	5	0	1	0	0	26
Nashua	1	0	0	0	5	6	7	5	1	1	0	0	26
New Jersey.													
Atlantic City	0	0	2	0	2	7	7	8	4	5	0	0	35
Cape May	1	1	1	3	2	7	7	6	4	0	1	0	33
Somerville	2	0	1	2	5	10	11	7	5	1	0	0	44
New Mexico.													
Albert	0	0	3	2	8	4	14	8	6	1	0	0	46
Fort Wingate	0	0	3	0	1	0	5	0	2	0	0	0	11
Roswell	0	0	1	4	3	6	6	5	7	1	0	0	33
Santa Fe	0	2	3	5	6	6	24	17	11	3	0	0	77
New York.													
Albany	0	0	0	1	6	11	7	6	0	1	0	0	32
Binghamton	0	0	0	2	5	10	9	6	1	1	0	0	34
Buffalo	1	0	0	1	7	10	5	8	5	2	1	0	40
New York	1	0	0	2	6	8	10	5	4	1	0	0	37
Oswego	0	0	0	1	5	10	6	3	2	3	0	0	30
Rochester	0	0	0	2	4	11	11	5	5	1	0	0	39
South Canisteo	0	0	0	1	7	14	8	10	4	1	1	0	46
Syracuse	0	0	0	2	6	11	6	6	2	1	0	0	34
North Carolina.													
Asheville	1	1	0	6	6	17	14	16	7	0	0	0	68
Brewers	1	1	0	2	8	18	17	20	3	0	1	0	71
Charlotte	1	0	1	4	7	13	12	12	6	1	2	0	59
Hatteras	1	1	1	3	3	6	5	4	3	2	2	0	31
Raleigh	0	1	0	2	5	12	12	14	4	0	1	0	51
Wilmington	0	3	1	4	8	12	13	15	3	2	2	1	64
North Dakota.													
Bismarck	0	0	0	1	5	8	5	3	4	1	0	0	27
Devils Lake	0	0	0	2	2	5	8	3	2	0	0	0	22
Ohio.													
Cincinnati	1	1	0	3	6	9	10	10	7	0	0	0	47
Cleveland	1	0	0	4	7	9	9	12	4	1	0	0	47
Columbus	1	0	0	4	7	8	13	12	3	1	0	0	49
Sandusky	1	0	0	2	6	9	9	12	2	2	0	0	43
Toledo	0	1	0	2	5	9	10	10	3	2	0	0	42
Oklahoma.													
Arapaho	0	0	0	1	9	9	9	8	7	0	0	0	43
Marlow	1	1	1	4	9	11	5	6	5	1	0	0	44
Oklahoma	0	2	5	8	9	9	12	13	9	0	0	0	67
Pawhuska	0	0	3	1	4	9	6	7	4	0	0	0	34
Vinita	2	2	5	2	10	5	2	2	5	0	0	0	35
Oregon.													
Astoria	0	0	0	0	0	0	0	0	0	0	0	0	0
Baker City	0	0	0	0	0	0	11	4	0	0	0	0	15
Portland	0	1	0	0	1	0	2	0	0	1	0	0	5
Roseburg	0	0	0	0	0	0	0	1	0	0	0	0	1
Pennsylvania.													
Erie	0	0	0	1	5	10	5	5	3	3	0	0	32
Harrisburg	0	0	0	3	1	12	8	9	3	1	0	0	37
Philadelphia	0	0	1	1	4	10	6	7	2	2	0	0	33
Pittsburg	0	0	0	3	5	14	8	13	5	1	0	0	49
Scranton	0	0	0	1	4	13	7	4	3	1	0	0	33
Wellsboro	0	0	0	1	3	8	6	5	2	1	0	0	26
Rhode Island.													
Block Island	0	0	0	1	2	3	2	3	5	1	1	0	18
Narragansett	0	0	0	2	1	3	3	2	2	0	1	0	14
Providence	0	0	0	1	3	5	6	4	2	1	1	0	23

TABLE III.—*Total number of days with thunderstorms, etc.*—Continued.

State and station.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
South Carolina.													
Charleston	1	1	3	2	4	12	16	18	7	3	0	0	67
Columbia	1	0	0	6	5	12	15	17	4	0	1	1	62
South Dakota.													
Huron	0	0	0	1	7	6	8	8	3	0	0	0	33
Pierre	0	0	0	2	7	7	5	7	5	0	0	0	33
Rapid City	0	0	0	0	6	7	6	6	0	0	0	0	25
Yankton	0	0	0	4	10	5	7	10	5	1	0	0	42
Tennessee.													
Chattanooga	1	0	3	3	3	13	13	20	18	0	1	0	75
Knoxville	0	0	0	5	8	11	14	18	8	0	3	0	67
Memphis	2	2	2	6	9	4	9	7	5	0	3	1	50
Nashville	0	2	2	9	6	10	7	15	8	1	2	0	62
Texas.													
Abilene	0	0	0	0	8	5	5	2	7	1	0	0	28
Amarillo	0	0	1	1	6	7	10	8	6	0	1	0	40
Corpus Christi	0	1	3	4	3	3	6	2	4	1	1	0	28
Del Rio	0	0	0	2	3	3	4	3	4	1	0	0	20
El Paso	1	1	0	2	2	0	14	10	5	1	1	0	37
Fort Worth	1	0	1	1	9	6	6	9	7	0	0	2	42
Galveston	2	2	0	3	1	2	13	5	6	1	0	1	36
Palestine	2	1	2	5	13	8	7	10	7	0	0	3	58
San Antonio	1	1	2	7	6	5	8	3	8	2	0	3	46
Taylor	2	0	2	6	9	6	12	5	7	0	1	2	52
Utah.													
Levan	2	1	0	3	3	4	13	7	3	0	0	0	36
Modena	2	0	0	4	2	0	22	11	4	0	0	0	45
Salt Lake City	2	0	2	3	2	5	12	12	3	0	0	0	41
Vermont.													
Burlington	0	0	0	0	6	8	10	8	6	1	0	0	39
Northfield	0	0	0	0	7	9	7	6	3	2	0	0	34
Jacksonville	0	0	0	0	4	2	6	9	0	0	0	0	21
Virginia.													
Cape Henry	0	1	0	8	7	10	12	12	2	1	0	0	53
Dale Enterprise	0	0	0	5	5	13	12	18	7	0	0	0	60
Lynchburg	0	0	1	4	2	10	7	11	4	0	0	0	39
Mount Weather	0	0	1	5	5	14	11	17	2	0	0	0	55
Norfolk	0	1	0	6	5	6	9	10	2	0	0	0	39
Richmond	0	0	0	5	4	12	10	15	3	0	0	0	49
Wytheville	1	0	1	2	4	10	5	16	6	0	0	0	45
Washington.													
North Head	0	0	0	0	0	0	0	0	0	2	0	1	3
Port Crescent	0	0	0	0	0	0	2	0	0	0	0	0	2
Seattle	0	0	1	0	0	4	1	0	0	1	0	0	7
Spokane	0	0	0	0	3	1	4	1	0	0	0	0	9
Tacoma	0	1	0	0	0	2	1	1	0	0	1	0	6
Tatoosh Island	2	0	0	0	0	0	2	0	0	2	1	1	8
Walla Walla	0	0	0	0	3	1	6	4	0	0	0	0	14
West Virginia.													
Elkins	0	0	1	6	5	14	11	14	3	1	1	0	56
Parkersburg	0	0	0	5	5	12	8	10	3	0	1	0	44
Upper Tract	0	0	1	5	6	14	9	19	3	0	0	0	57
Wisconsin.													
Green Bay	0	0	0	2	7	7	7	9	7	1	0	0	40
La Crosse	0	0	1	3	8	7	6	7	8	0	0	0	40
Madison	0	0	0	2	7	7	10	14	7	0	0	0	47
Milwaukee	2	0	0	3	4	5	4	9	4	0	0	0	31
Wyoming.													
Cheyenne	0	0	0	3	7	7	16	11	9	1	0	0	54
Griggs	0	0	0	2	12	14	12	11	6	0	0	0	57
Lander	0	0	0	1	3	3	6	7	3	0	0	0	23
Yellowstone Park	0	0	0	0	5	2	16	12	1	0	0	0	36

TABLE IV.—*Annual climatological summary, Canadian stations, 1906.*

Stations.	Pressure.*			Temperature.				Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Total depth of snowfall.†
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
St. Johns, N. F	29.79	29.93	+.02	41.5	+1.0	49.0	34.0	62.67	+ 8.04	21.3
Sydney, C. B. I	29.94	29.98	+.04	43.1	+1.8	51.4	34.8	67.56	+17.28	71.5
Halifax, N. S	29.90	30.01	+.04	44.8	+2.0	53.4	36.2	64.18	+ 7.15	45.7
Grand Manan, N. B	29.92	29.97	.00	43.9	+1.1	51.2	36.6	49.81	+ 2.56	52.7
Yarmouth, N. S	29.95	30.02	+.04	43.9	+0.7	51.0	36.8	52.42	+ 2.09	51.2
Charlottetown, P. E. I	29.93	29.97	+.03	42.4	+1.4	49.8	35.1	52.75	+11.13	77.1
Chatham, N. B	29.93	29.95	+.01	41.8	+3.1	52.3	31.2	39.91	— 1.38	137.5
Father Point, Que	29.94	29.96	+.03	36.2	+1.4	43.8	28.6	31.49	— 1.50	95.4
Quebec, Que	29.68	30.01	+.03	39.4	+1.2	48.2	30.7	33.76	— 7.96	112.8
Montreal, Que	29.81	30.02	+.03	44.3	+2.8	50.7	37.9	37.83	— 3.16	100.3
Rockliffe, Ont	29.42	30.04	+.05	39.0	+0.8	50.8	27.3	19.76	—10.70	......
Ottawa, Ont	29.68	30.01	+.01	43.3	+2.7	52.5	34.1	26.29	— 6.31	70.8
Kingston, Ont	29.74	30.06	+.05	44.2	+1.1	52.2	36.1	32.29	— 0.52	53.5
Toronto, Ont	29.66	30.04	+.02	46.8	+2.6	55.2	38.4	31.41	— 2.28	30.7
White River, Ont	28.71	30.05	+.07	34.0	+1.9	46.8	21.3	‡22.99	— 1.80	86.0
Port Stanley, Ont	29.41	30.06	+.03	46.4	+1.7	54.7	38.1	35.58	+ 1.16	33.7
Saugeen, Ont	29.34	30.06	+.05	44.8	+2.4	53.3	36.3	34.00	— 0.21	85.5
Parry Sound, Ont	29.34	30.04	+.04	42.4	+2.2	52.6	32.2	44.58	+ 6.31	78.2
Port Arthur, Ont	29.32	30.03	+.03	37.7	+3.3	47.2	28.2	25.08	+ 0.32	21.4
Winnipeg, Man	29.18	30.04	+.04	37.3	+4.2	48.5	26.1	22.54	+ 1.56	39.4
Minnedosa, Man	28.16	30.02	+.02	37.1	+5.5	48.6	25.6	20.80	+ 4.35	27.9
Qu'Appelle, Sask	27.69	29.97	—.01	37.2	+3.9	47.8	26.6	20.39	+ 4.31	48.5
Medicine Hat, Alberta	27.65	29.94	—.02	44.0	+3.7	56.1	31.9	13.43	— 0.87	10.5
Swift Current, Sask	27.40	30.00	+.03	40.2	+2.7	51.6	28.9	18.98	+ 3.51	22.9

TABLE IV.—*Annual climatological summary*—Continued.

Stations.	Pressure.*			Temperature.				Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Total depth of snowfall.†
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
Calgary, Alberta	26.40	29.97	+.04	39.3	+2.1	51.7	26.9	16.24	+ 1.37	29.6
Banff, Alberta	25.35	29.98	+.05	37.6	+2.9	49.1	26.0	14.58	— 7.33	27.4
Edmonton, Alberta	27.62	29.93	.00	39.3	+3.7	50.6	28.0	‡18.75	+ 2.92	....
Prince Albert, Sask	28.36	29.94	—.04	34.4	+3.9	45.3	23.5	17.05	+ 2.14	48.2
Battleford, Sask	28.23	30.00	+.03	36.8	+4.1	48.2	25.4	10.64	— 3.29	8.4
Kamloops, B. C	28.71	29.93	.00	50.2	+3.1	60.3	40.2	11.09	— 0.54	13.9
Victoria, B. C	29.92	30.02	+.02	51.3	+2.7	58.3	44.3	27.22	—10.92	2.9
Barkerville, B. C	25.63	29.96	+.06	36.9	+0.7	46.4	27.4	37.63	+ 4.07	......
Hamilton, Bermuda	29.96	30.12	+.03	70.4	+0.7	75.1	65.6	61.26	— 0.65	0.0

* Pressure reduced to standard gravity and to the mean of 24 hourly observations. † For the snow year, July 1, 1905, to June 30, 1906. ‡ One month's precipitation estimated.

TABLE V.—*Heights of rivers referred to zeros of gages, 1906.*

Stations.	Highest water.		Lowest water.		Annual range.
	Stage.	Date.	Stage.	Date.	
Milk River.	Feet.		Feet.		Feet.
Havre, Mont. (118)	9.9	June 8	2.2	Oct. 17–Nov. 11	7.7
James River.					
Huron, S. Dak. (109)	9.0	Mar. 31	0.4	Oct. 13, 17	8.6
Republican River.					
Clay Center, Kans	10.5	May 5	4.9	Oct. 7	5.6
Smoky Hill–Kansas River.					
Abilene, Kans	9.0	May 26	0.1	Sept. 13–15, 28–30; Oct. 11, 14, 21	8.9
Manhattan, Kans. (6)	8.9	Sept. 19	1.8	Sept. 30, Oct. 1	7.1
Topeka, Kans. (20)	12.3	Aug. 5	5.6	Oct. 24–27	6.7
Missouri River.					
Bismarck, N. Dak	12.6	June 11, 12	0.0	Oct. 4	12.6
Pierre, S. Dak. (104)	10.7	June 13	—1.9	Nov. 20	12.6
Sioux City, Iowa	15.2	June 16	2.0	Mar. 7	13.2
Blair, Nebr	14.6	June 18	2.6	Mar. 15	12.0
Omaha, Nebr. (20)	16.8	June 18	3.2	Jan. 14–16, Dec. 13	13.6
St. Joseph, Mo	11.9	June 20	—2.6	Jan. 10	14.5
Kansas City, Mo	19.7	June 21	2.3	Dec. 26	17.4
Glasgow, Mo	15.5	June 22	2.2	Dec. 28	13.3
Boonville, Mo	17.4	June 23	5.5	Jan. 15	11.9
Hermann, Mo	16.6	Mar. 29	4.8	Dec. 29, 30	11.8
Minnesota River.					
Mankato, Minn	9.1	Apr. 17	2.9	Feb. 11–16, 18, 19	6.2
St. Croix River.					
Stillwater, Minn. (136)	13.8	Apr. 18	4.6	Oct. 22	9.2
Red Cedar River.					
Cedar Rapids, Iowa	16.9	Mar. 30	2.8	Jan. 3, 4	14.1
Des Moines River.					
Des Moines, Iowa (34)	11.7	Mar. 30	1.8	Aug. 5–9	9.9
Illinois River.					
La Salle, Ill	20.9	Feb. 26	10.6	July 16–19	10.3
Peoria, Ill	15.9	Mar. 7–12	6.8	July 18–22, 24–28	9.1
Clarion River.					
Clarion, Pa	8.0	Mar. 28	—0.8	Aug. 5, 6	8.8
Conemaugh River.					
Johnstown, Pa	17.0	June 7	0.6	May 25, 26, Sept. 30	16.4
Allegheny River.					
Warren, Pa. (1)	7.4	Dec. 7	—0.6	Sept. 17–20	8.0
Franklin, Pa	9.6	Mar. 28	0.0	July 19–21, 27–29	9.6
Parker, Pa	10.0	Mar. 28	—0.1	July 28	10.1
Freeport, Pa	17.0	Mar. 28	1.0	July 15, 16, Aug. 5, 6	16.0
Springdale, Pa	20.1	Apr. 1	5.8	July 15, 16	14.3
Cheat River.					
Rowlesburg, W. Va. (23)	10.1	Apr. 26	0.9	Sept. 27	9.2
Youghiogheny River.					
Confluence, Pa	9.3	Jan. 23	—0.1	Oct. 18, 19	9.4
West Newton, Pa. (20)	12.8	Jan. 23	0.0	*	12.8
Monongahela River.					
Weston, W. Va	9.5	Mar. 15	—1.8	Nov. 10–17	11.3
Fairmont, W. Va	24.0	Mar. 16	12.2	May 21	11.8
Greensboro, Pa. (1)	22.0	Apr. 26	6.5	July 12–19	15.5
Lock No. 4, Pa	25.8	Apr. 27	6.2	May 25, 26	19.6
Beaver River.					
Ellwood Junction, Pa. (24)	8.7	Mar. 28	0.7	Sept. 19	8.0
Muskingum River.					
Zanesville, Ohio	24.1	Mar. 28	7.8	June 13, 16, 17; Sept. 15–17	16.3
Beverly, Ohio	22.2	Mar. 29	3.8	Sept. 20	18.4
Little Kanawha River.					
Glenville, W. Va	14.6	Dec. 18	—0.6	Feb. 9, May 26, Sept. 8	15.2
Creston, W. Va	19.5	Mar. 16	—3.0	Nov. 4	22.5
New–Great Kanawha River.					
Radford, Va	18.5	Oct. 19	0.3	May 18–21, 25–29; June 4, 5	18.2
Hinton, W. Va	13.0	Mar. 28	1.6	July 3–5, 14–16	11.4
Charleston, W. Va	28.5	Jan. 24	3.8	Feb. 14	24.7
Scioto River.					
Columbus, Ohio (26)	15.6	Mar. 28	0.0	May 22	15.6
Licking River.					
Falmouth, Ky. (13)	22.4	Mar. 31	0.9	May 23–25	21.5
Miami River.					
Dayton, Ohio (12)	11.9	Mar. 28	0.6	Sept. 14–17, Oct. 23	11.3

TABLE V.—*Heights of rivers referred to zeros of gages, 1906*—Continued.

Stations.	Highest water.		Lowest water.		Annual range.
	Stage.	Date.	Stage.	Date.	
	Feet.		*Feet.*		*Feet.*
Kentucky River.					
Jackson, Ky	18.8	Mar. 31	4.4	July 3, Dec. 16	14.4
Beattyville, Ky	19.3	Dec. 18	0.1	*	19.2
High Bridge, Ky	20.2	Mar. 31	9.0	Dec. 1	11.2
Frankfort, Ky	21.1	Mar. 31	5.5	Nov. 15, 17, 18	15.6
Wabash River.					
Mt. Carmel, Ill. (7)	23.6	Apr. 8	0.8	Aug. 6-11	22.8
Cumberland River.					
Burnside, Ky	38.5	Mar. 31	0.3	Nov. 17	38.2
Celina, Tenn	34.0	Apr. 2	1.5	July 7, 8	32.5
Carthage, Tenn	32.4	Apr. 2	1.4	July 10	31.0
Nashville, Tenn	34.4	Apr. 3	7.8	July 7, 11, 12, 15	26.6
Clarksville, Tenn	43.5	Nov. 20	2.0	July 13	41.5
Powell River.					
Tazewell, Tenn	20.5	Nov. 20	0.2	Oct. 30-Nov. 11	20.3
Clinch River.					
Speer's Ferry, Va	20.0	Nov. 19	—0.7	July 16	20.7
Clinton, Tenn	31.0	Nov. 21	3.0	July 16, 17	28.0
South Fork of Holston River.					
Bluff City, Tenn	11.6	Jan. 23	0.4	July 14, 15	11.2
Holston River.					
Rogersville, Tenn	17.5	Jan. 23	1.7	July 3, 4, 13-16 Nov. 9, 10	15.8
French Broad River.					
Asheville, N. C	7.8	Jan. 23	—0.2	May 25	8.0
Little Tennessee River.					
McGhee, Tenn	30.0	Nov. 19	3.1	Sept. 18	26.9
Hiwassee River.					
Charleston, Tenn	30.0	Nov. 20	1.0	Feb. 15, 16	29.0
Tennessee River.					
Knoxville, Tenn	23.0	Nov. 20	1.4	May 26, 27, July 14	21.6
Loudon, Tenn	27.0	Nov. 20	1.9	May 25, June 11, 12	25.1
Kingston, Tenn	22.6	Nov. 20	1.8	June 12	20.8
Chattanooga, Tenn	33.3	Nov. 22	3.2	June 12, 13	30.1
Bridgeport, Ala	23.4	Nov. 23	1.8	May 25, 26	21.6
Guntersville, Ala	29.8	Nov. 24	4.0	June 14	25.8
Florence, Ala	16.7	Nov. 25	1.5	May 25	15.2
Riverton, Ala	27.2	Nov. 26	3.5	June 15	23.7
Johnsonville, Tenn	25.3	Oct. 9	3.2	June 17	22.1
Ohio River.					
Pittsburg, Pa	18.8	Apr. 1	1.4	Feb. 12	17.4
Davis Island Dam, Pa	18.1	Apr. 1	2.2	July 15, 16	15.9
Beaver Dam, Pa	26.5	Apr. 1	2.8	July 12, 13	23.7
Wheeling, W. Va	26.6	Apr. 1	2.1	July 15	24.5
Parkersburg, W. Va	30.1	Mar. 31	2.7	July 16	27.4
Point Pleasant, W. Va	37.3	Apr. 2	2.5	Sept. 19, 20	34.8
Catlettsburg, Ky	43.9	Apr. 2	3.6	July 17, Sept. 21	40.3
Portsmouth, Ohio	47.4	Apr. 2	4.9	Sept. 21	42.5
Maysville, Ky	46.3	Apr. 2	5.0	Sept. 22	41.3
Cincinnati, Ohio	50.4	Apr. 2	7.1	Sept. 22	43.3
Madison, Ind	43.0	Apr. 3	6.0	Sept. 18	37.0
Louisville, Ky	26.3	Apr. 3	3.1	Sept. 20	23.2
Evansville, Ind	41.1	Apr. 6	5.1	Sept. 21	36.0
Mount Vernon, Ind. (6)	41.3	Apr. 7	4.4	Sept. 22	36.9
Paducah, Ky	40.5	Apr. 8	5.3	Nov. 17	35.2
Cairo, Ill	46.9	Apr. 9	12.0	Nov. 12, 15-17	34.9
St. Francis River.					
Marked Tree, Ark	17.8	Dec. 18-20	1.9	Aug. 10, 11	15.9
Neosho River.					
Neosho Rapids, Kans	21.7	June 9	0.7	Sept. 10, Oct. 12, 13, 20-22	21.0
Iola, Kans	8.6	June 10	—1.3	Oct. 26, 27	9.9
Oswego, Kans	14.5	June 13	0.0	Oct. 28-Nov. 7	14.5
Fort Gibson, Ind. T	27.0	June 7	8.0	Dec. 26	19.0
Canadian River.					
Calvin, Ind. T	14.0	Aug. 7	1.8	Oct. 12	12.2
Black River.					
Blackrock, Ark	24.1	Apr. 2	2.6	Sept. 25, 26	21.5
White River.					
Calicorock, Ark	30.4	Mar. 28	0.4	Nov. 12-16	30.0
Batesville, Ark	29.4	Mar. 28	2.3	Nov. 16	27.1
Newport, Ark	30.5	Mar. 29	2.5	Aug. 8, 9, Nov. 16, 17	28.0
Clarendon, Ark	33.1	Apr. 6	10.0	Aug. 10, 11	23.1
Arkansas River.					
Wichita, Kans	4.0	Sept. 20	—1.3	June 28	5.3
Tulsa, Ind. T. (3)	8.0	Sept. 20	2.5	Mar. 22	5.5
Webbers Falls, Ind. T	18.0	June 7	3.0	Nov. 25-Dec. 1	15.0
Fort Smith, Ark	19.2	Aug. 10	2.0	Dec. 2	17.2
Dardanelle, Ark	19.0	May 4	1.9	Nov. 16	17.1
Little Rock, Ark	20.5	May 5	3.1	Nov. 15, 16	17.4
Yazoo River.					
Greenwood, Miss	32.6	Dec. 14	2.2	Sept. 18	30.4
Yazoo City, Miss	22.6	Apr. 27, 29	—1.3	Sept. 21-23	23.9
Ouachita River.					
Camden, Ark	35.0	Dec. 22	3.3	July 10, 11	31.7
Monroe, La	35.0	Feb. 9, 10	2.0	Nov. 16-18	33.0
Red River.					
Denison, Tex	13.4	Aug. 11	—0.2	Apr. 4	13.6
Arthur City, Tex	26.0	May 4	6.3	Jan. 21, 22, Feb. 5	19.7
Fulton, Ark	31.2	May 10	8.2	Nov. 16, 17	23.0
Shreveport, La	22.6	Jan. 1-3	0.4	Nov. 17, 19	22.2
Alexandria, La	29.7	Jan. 6	2.9	Nov. 19, 20	26.8
Mississippi River.					
Fort Ripley, Minn. (116)	10.1	Nov. 25	4.7	Aug. 20	5.4
St. Paul, Minn. (116)	13.3	June 12	5.0	Oct. 22, 23, Nov. 25	8.3
Red Wing, Minn. (130)	11.0	Apr. 18-20	3.2	Oct. 24	7.8
Reeds Landing, Minn. (40)	10.1	Apr. 19	2.3	Feb. 20-23	7.8
La Crosse, Wis. (100)	11.5	Apr. 20, 21	4.3	Oct. 22-24	7.2
Prairie du Chien, Wis. (116)	15.4	Apr. 22, 23	5.0	Oct. 23-26	10.4
Dubuque, Iowa (83)	16.6	Apr. 21-25	4.4	Dec. 15	12.2
Clinton, Iowa (100)	15.3	Apr. 22-27	4.6	Oct. 24, 26-29	10.7
Leclaire, Iowa (60)	10.4	Apr. 22-25	1.0	Mar. 19	9.4
Davenport, Iowa	14.0	Apr. 26	2.0	Dec. 20	12.0
Muscatine, Iowa	14.6	Apr. 23, 24	3.3	Dec. 21	11.3
Mississippi River—Cont'd.					
Galland, Iowa	7.9	Apr. 26-28	0.4	Dec. 24	7.5
Keokuk, Iowa	14.0	Apr. 24-27	0.9	Dec. 24	13.1
Warsaw, Ill	16.8	Apr. 24-27	4.8	Dec. 26	12.0
Hannibal, Mo	15.2	Apr. 25-29	1.0	Dec. 26	14.2
Grafton, Ill	18.3	Apr. 15	4.4	Dec. 28	13.9
St. Louis, Mo	26.2	Apr. 15	3.0	Dec. 28	23.2
Chester, Ill	22.7	Apr. 1, 16	2.6	Dec. 29	20.1
New Madrid, Mo	37.0	Apr. 9-12	10.1	Nov. 12, 13, 16, 17	26.9
Luxora, Ark. (d)	31.3	Apr. 14, 15	3.5	Nov. 15, 16	27.8
Memphis, Tenn	37.0	Apr. 16, 17	6.7	Nov. 14-16	30.3
Helena, Ark	47.0	Apr. 18, 19	9.9	Nov. 15-16	37.1
Arkansas City, Ark	50.0	Apr. 22	12.1	Nov. 17	37.9
Greenville, Miss	44.9	Apr. 23, 24	9.5	Nov. 17	35.4
Vicksburg, Miss	47.2	Apr. 26	9.1	Nov. 17	38.1
Natchez, Miss	46.7	Apr. 23, 30	11.7	Nov. 19	35.0
Baton Rouge, La	34.4	May 1-5	7.3	Nov. 17, 22	27.1
Donaldsonville, La	27.3	Apr. 30-May 5	5.4	Nov. 15, 16, 22	21.9
New Orleans, La	17.3	May 3, 5, 7	4.5	Nov. 15	12.8
Atchafalaya River.					
Simmesport, La	39.7	May 3-5	6.6	Nov. 17, 19	33.1
Melville, La	36.0	May 4	11.0	Nov. 17-21	25.0
Morgan City, La	5.5	Sept. 28	1.7	Dec. 25	3.8
Grand River.					
Grand Rapids, Mich	11.5	Jan. 25	1.2	July 15, 21-28 Sept. 9, 10, 14 Oct. 16-18, 21	10.3
Maumee River.					
Tiffin, Ohio (21)	6.1	Mar. 29	—0.3	July 3, 4	6.4
Connecticut River.					
Hartford, Conn. (24)	18.5	May 30	0.9	Oct. 15	17.6
Mohawk River.					
Utica, N. Y	12.9	Jan. 24			
Tribeshill, N. Y	8.0	Apr. 16	—0.6	Aug. 17, 18, Sept. 12-21	8.6
Schenectady, N. Y	10.8	Apr. 16	0.4	July 29, Aug. 18-20 Sept. 18-21	10.4
Hudson River.					
Glens Falls, N. Y	7.8	Apr. 18-21	3.1	Oct. 8	4.7
Troy, N. Y	11.9	Apr. 16, 17	—0.4	Aug. 19	12.3
Albany, N. Y	12.3	Mar. 5	0.5	Oct. 12, Dec. 4	11.8
Pompton River.					
Pompton Plains, N. J. (3)	6.3	Mar. 4	3.4	Sept. 11-19	2.9
Passaic River.					
Chatham, N. J. (36)	5.3	Apr. 16	2.0	Sept. 15-22, 25-27 Oct. 17-20	3.3
Lehigh River.					
Mauchchunk, Pa. (50)	11.0	Apr. 15	4.1	Mar. 25, 26, May 15-19	6.9
Schuylkill River.					
Reading, Pa	13.3	Mar. 4	—0.1	Sept. 12	13.4
Delaware River.					
Hancock, N. Y. (E. Br.)	10.6	Mar. 2	2.7	Sept. 16-20	7.9
Hancock, N. Y. (W. Br.)	8.3	Mar. 28	2.5	Sept. 17, 19	5.8
Port Jervis, N. Y. (13)	9.6	Apr. 16	0.0	Sept. 10-13, 28-Oct. 1, 4, 5	9.6
Phillipsburg, N. J. (51)	16.2	Apr. 16	0.5	Sept. 17, 19-22	15.7
Trenton, N. J	9.0	Apr. 16	0.7	Sept. 21-26	8.3
North Br. Susquehanna River.					
Binghamton, N. Y	9.9	Mar. 29 Apr. 16	1.8	Sept. 16, 19, 20	8.1
Towanda, Pa	10.2	Mar. 31	0.6	Sept. 14-22	9.6
Wilkes-Barre, Pa	17.7	Apr. 1	2.5	Sept. 19, 20, 24, 25	15.2
West Br. Susquehanna.					
Renovo, Pa. (47)	9.5	Jan. 24	—0.2	July 16, 17	9.7
Williamsport, Pa	11.5	Jan. 24	0.4	July 12	11.1
Juniata River.					
Huntingdon, Pa	7.9	Mar. 31	2.9	Oct. 16	5.0
Susquehanna River.					
Harrisburg, Pa	11.4	Apr. 16	0.9	Sept. 24, 25	10.5
Shenandoah River.					
Riverton, Va	16.0	Oct. 20	—0.6	Jan. 4, 5	16.6
Potomac River.					
Cumberland, Md	8.0	Mar. 28	1.8	May 26, 29-June 5	6.2
Harpers Ferry, W. Va	15.8	Oct. 21	—0.2	July 29, 30	16.0
James River.					
Buchanan, Va	15.6	Oct. 20	2.1	July 12, 13	13.5
Lynchburg, Va	14.6	Oct. 20	0.6	July 9, 10	14.0
Columbia, Va	31.5	Oct. 21	2.7	July 23	28.8
Richmond, Va	18.7	Oct. 22	—0.4	Oct. 14	19.1
Dan River.					
Danville, Va	7.7	Jan. 4	0.0	*	7.7
Staunton River.					
Randolph, Va	25.7	Oct. 21	4.0	May 25, 26, Sept. 24, 25	21.7
Roanoke River.					
Clarksville, Va	11.0	Jan. 6	0.0	May 24, 25, June 4, 5 July 2-5, 15	11.0
Weldon, N. C	37.3	Jan. 7	9.3	May 24-27, June 6	28.0
Tar River.					
Tarboro, N. C	22.1	Aug. 23	1.6	May 28, July 4	20.5
Greenville, N. C	15.8	Aug. 24	3.3	July 4	12.5
Haw River.					
Moncure, N. C	22.8	Jan. 4	5.4	Jan. 22	17.4
Cape Fear River.					
Fayetteville, N. C	40.5	Aug. 30	2.6	May 27	37.9
Waccamaw River.					
Conway, S. C	8.8	Feb. 22, 23	1.2	May 21	7.6
Pedee River.					
Cheraw, S. C	31.8	Sept. 1	2.0	May 26	29.8
Smiths Mills, S. C	16.4	Feb. 3, 4	2.4	May 29	14.0
Lynch Creek.					
Effingham, S. C	14.5	June 17, 18	3.1	Dec. 1, 2	11.4
Black River.					
Kingstree, S. C. (c)	11.8	June 20-22	0.6	June 4, 5	11.2
Catawba-Wateree River.					
Mount Holly, N. C	10.0	Jan. 24	1.6	July 3-6	8.4
Camden, S. C	28.6	Sept. 1 Oct. 21	4.7	May 21	23.9
Broad River.					
Blairs, S. C	15.6	Jan. 5	0.2	Dec. 5	15.4

TABLE V.—*Heights of rivers referred to zeros of gages, 1906*—Continued.

Stations.	Highest water.		Lowest water.		Annual range.
	Stage.	Date.	Stage.	Date.	
	Feet.		*Feet.*		*Feet.*
Saluda River.					
Chappels, S. C	18.0	Jan. 6	1.9	Nov. 15	16.1
Congaree River.					
Columbia, S. C	17.5	Jan. 5	0.7	May 20	16.8
Santee River.					
St. Stephens, S. C	11.7	Jan. 13	2.4	May 24	9.3
Edisto River.					
Edisto, S. C	6.2	June 18	1.0	May 25–27	5.2
Broad River.					
Carlton, Ga	19.0	Jan. 23	2.3	May 25	16.7
Savannah River.					
Calhoun Falls, S. C	11.8	Mar. 20	2.6	Dec. 3–6	9.2
Augusta, Ga	29.6	Jan. 5	7.1	June 3	22.5
Oconee River.					
Milledgeville, Ga	25.4	Jan. 24	2.7	Sept. 10	22.7
Dublin, Ga	19.2	Jan. 28	−0.2	Nov. 3	19.4
Ocmulgee River.					
Macon, Ga	19.9	Jan. 23	2.0	June 3, 9	17.9
Abbeville, Ga	14.9	Jan. 29	2.3	June 11	12.6
Flint River.					
Woodbury, Ga	7.8	Mar. 21	0.2	June 8, 9, 12, July 1	7.6
Montezuma, Ga	15.0	Jan. 26	2.5	May 23, June 11, 12	12.5
Albany, Ga	18.1	Jan. 27	1.2	June 10	16.9
Bainbridge, Ga. (*b*)	19.2	Jan. 27, 28	3.5	May 3, 4	15.7
Chattahoochee River.					
Oakdale, Ga	21.5	Jan. 5	2.0	July 5	19.5
Westpoint, Ga	18.7	Mar. 20	2.5	May 22, July 1, 3	16.2
Eufaula, Ala	36.2	Mar. 22	1.7	Dec. 9	34.5
Alaga, Ala. (*a*)	29.7	Mar. 23	3.6	June 12	26.1
Coosa River.					
Rome, Ga	28.2	Mar. 21	1.6	Nov. 10–17	26.6
Gadsden, Ala	27.7	Mar. 19	1.8	June 12, 13	25.9
Lock No. 4, Ala	22.2	Mar. 20	1.4	June 13	20.8
Wetumpka, Ala	51.5	Mar. 20	4.3	June 5, 13	47.2
Tallapoosa River.					
Milstead, Ala	42.8	Mar. 21	2.0	June 11–13, July 2	40.8
Alabama River.					
Montgomery, Ala	50.2	Mar. 22	1.8	June 13, 14	48.4
Selma, Ala	50.2	Mar. 24	3.0	June 14, 15	47.2
Black Warrior River.					
Tuscaloosa, Ala	56.8	Mar. 20	4.8	July 7, 9	52.0
Tombigbee River.					
Columbus, Miss	18.3	Apr. 1, 2	−3.1	June 25	21.4
Vienna, Ala	30.8	Mar. 22	0.5	Nov. 13, 14	30.3
Demopolis, Ala	52.8	Mar. 26	−1.8	July 11	54.6
Pascagoula River.					
Merrill, Miss. (*e*)	21.6	Mar. 25, 26	1.4	Sept. 5, 19	20.2
Pearl River.					
Columbia, Miss	23.0	Mar. 23, 24	3.4	Aug. 26–Sept. 5	19.6

TABLE V.—*Heights of rivers referred to zeros of gages, 1906*—Continued.

Stations.	Highest water.		Lowest water.		Annual range.
	Stage.	Date.	Stage.	Date.	
	Feet.		*Feet.*		*Feet.*
Sabine River.					
Logansport, La	29.6	Jan. 5	2.1	Oct. 12, 13	27.5
Neches River.					
Rockland, Tex	15.5	Jan. 8, 9, 11	0.0	Aug. 30, 31, Sept. 21 Nov. 15–Dec. 5	15.5
Beaumont, Tex	4.9	Oct. 20	0.6	Nov. 28, 29	4.3
Trinity River.					
Dallas, Tex	34.9	May 18	4.0	Oct. 15	30.9
Long Lake, Tex	40.4	Dec. 24	3.2	Nov. 20	37.2
Riverside, Tex	28.9	Jan. 5, 6	0.6	Nov. 22, 23	28.3
Liberty, Tex	25.0	Jan. 12, 13	3.9	Nov. 22	21.1
Brazos River.					
Kopperl, Tex	17.0	June 5	−0.4	May 1, 2	17.4
Waco, Tex	19.6	June 6	2.7	Mar. 26–28	16.9
Valley Junction, Tex	24.3	June 7	0.1	Dec. 7, 8	24.2
Hempstead, Tex	29.2	June 9	−1.6	Nov. 22–27, Dec. 15	30.8
Booth, Tex	21.4	June 9	2.2	Dec. 1–14	19.2
Colorado River.					
Ballinger, Tex	31.0	Aug. 6	1.0	Mar. 18–28, Dec. 12–31	30.0
Austin, Tex	19.5	Aug. 12	0.7	Jan. 17	18.8
Columbus, Tex	33.5	Aug. 15	6.2	May 24, Dec. 31	27.3
Guadalupe River.					
Gonzales, Tex	14.0	Feb. 14	0.1	June 21–25, 28, 29	13.9
Victoria, Tex	14.8	Feb. 16	0.7	June 22, Sept. 6	14.1
Red River of the North.					
Moorhead, Minn. (117)	15.5	Apr. 9	9.3	Oct. 16, 20–22	6.2
Snake River.					
Lewiston, Idaho	10.4	Nov. 15	−0.3	Aug. 29–Sept. 3, Sept. 7–9	10.7
Riparia, Wash	11.0	Nov. 16	0.4	Aug. 23	10.6
Columbia River.					
Wenatchee, Wash	27.0	July 14–16	3.7	Jan. 1, 2–8	23.3
Umatilla, Oreg. (*f*)	14.7	May 31	0.1	Jan. 12–14	14.6
The Dalles, Oreg	23.4	June 1	−0.6	Jan. 12, 15	24.0
Willamette River.					
Albany, Oreg	14.6	Feb. 26	0.6	Oct. 3	14.0
Salem, Oreg	15.1	Nov. 16	−0.5	Sept. 5–8	15.6
Portland, Oreg	16.0	Nov. 18	1.2	Oct. 9, 10	14.8
Sacramento River.					
Red Bluff, Cal	25.5	Mar. 31 Apr. 1	0.3	Oct. 23–26, 29–Nov. 2 Nov. 26	25.2
Sacramento, Cal	27.4	Apr. 2	6.8	Oct. 22	20.6

Figures in parenthesis indicate number of days river was frozen during the year.
* Various dates.
(*a*) May, 24 days only.
(*b*) March 23 and May 20 days only.
(*c*) March 29 and April 26 days only.
(*d*) January, 26 days only.
(*e*) February, 27 days only.
(*f*) March, 30 days only.

TABLE VI.—*Average monthly and annual departures of temperature from the normal, during 1906.*

Districts.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
New England	+6.7	+0.7	−2.3	+0.5	−0.7	−0.7	−1.0	+2.3	+1.3	+1.0	−0.6	−4.1	+0.3
Middle Atlantic	+6.4	−1.8	−2.8	+2.7	+0.7	+0.8	−0.7	+2.6	+3.9	0.0	+1.3	−0.5	+1.0
South Atlantic	+2.8	−2.7	−2.1	+2.0	−0.5	+0.9	−1.5	+2.1	+3.8	−0.6	+1.0	+0.5	+0.5
Florida Peninsula	+0.8	−2.0	−1.0	+0.5	+0.1	+1.0	−0.4	−0.1	+1.9	−0.2	+1.4	+0.1	0.0
East Gulf	+0.8	−4.8	−3.4	+0.7	−1.5	+1.4	−1.2	+1.4	+3.1	−3.1	+3.0	+3.0	0.0
West Gulf	+2.9	−2.7	−4.2	+0.3	+0.3	+0.9	−1.5	−0.2	+2.9	−3.5	+1.3	+3.6	0.0
Ohio Valley and Tennessee	+5.8	−3.6	−5.6	+2.2	+0.5	−0.2	−1.8	+2.7	+4.1	−0.7	+1.4	+0.7	+0.5
Lower Lakes	+8.7	−0.9	−4.1	+2.2	0.0	+0.1	−0.3	+3.8	+4.0	−0.1	+0.6	−1.5	+1.0
Upper Lakes	+8.7	+0.3	−3.4	+4.2	−0.1	+0.5	−0.2	+3.7	+5.1	+0.7	+2.6	−0.5	+1.8
North Dakota	+7.4	+3.8	−1.0	+6.4	−2.0	0.0	−0.5	+0.5	+5.4	+2.3	+2.7	−2.9	+1.8
Upper Mississippi Valley	+7.5	−0.3	−6.6	+3.4	+0.5	−1.6	−2.1	+2.2	+4.5	−0.4	+1.3	+1.2	+0.8
Missouri Valley	+8.8	+3.7	−7.4	+3.9	+2.1	−1.7	−2.8	+1.1	+2.7	−0.6	+0.5	+0.9	+0.9
Northern Slope	+8.6	+6.7	−7.5	+3.5	−0.6	−2.8	−0.7	−0.5	+2.6	+1.0	−1.2	+2.0	+0.9
Middle Slope	+7.6	+3.8	−8.9	+1.8	+1.3	−1.2	−3.6	+0.2	+0.3	−2.7	−0.5	+3.9	+0.2
Southern Slope	+3.2	+0.5	−6.3	−0.5	−0.3	−0.8	−2.9	−2.0	−0.2	−5.6	−2.8	+4.6	−1.1
Southern Plateau	+1.5	+4.4	+0.6	−0.3	−2.0	−0.8	−0.8	−1.9	−0.8	+0.2	−1.2	+2.9	+0.2
Middle Plateau	+0.2	+4.2	−0.1	0.0	−0.9	−3.4	+0.8	−0.8	−1.2	+0.3	−2.1	+5.5	−0.2
Northern Plateau	+4.4	+4.2	−3.4	+3.7	−0.7	−2.3	+6.4	+0.2	+2.7	+2.7	−0.3	+3.0	+1.7
North Pacific	+3.1	+3.7	−0.5	+2.7	−0.6	−1.1	+3.3	+0.5	+0.6	+1.9	+0.1	+0.7	+1.2
Middle Pacific	+2.7	+4.2	−0.6	+1.5	−1.4	−0.8	+1.4	−0.4	+0.1	+3.0	−0.4	−0.3	+0.8
South Pacific	+2.6	+3.5	+0.5	−0.6	−2.2	0.0	+2.2	0.0	+0.8	+2.7	−1.3	+0.8	+0.8

TABLE VII.—*Monthly and annual departures of precipitation from the normal, during 1906.*

Districts.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
New England	−1.0	−0.8	+1.2	−0.6	+1.0	+0.8	+0.4	−1.4	−0.6	−0.1	−1.2	+0.5	−1.8
Middle Atlantic	−0.9	−0.9	+0.4	−0.8	−0.4	+0.7	+1.4	+3.0	−2.1	+1.5	−1.5	−0.2	+0.2
South Atlantic	0.0	−0.9	−0.6	−2.0	+0.2	+1.9	+1.6	−0.2	−1.4	−0.4	−1.9	−0.9	−4.6
Florida Peninsula	+1.1	+0.1	+0.3	−1.2	+3.6	+0.9	+3.1	+1.1	−3.0	−1.6	+0.1	−2.1	+2.4
East Gulf	−1.2	−2.2	+2.7	−3.3	−0.3	−0.9	+1.6	−0.7	+6.1	+0.6	−1.9	−0.7	−0.2
West Gulf	−1.2	−1.5	−0.8	−1.7	−1.1	−0.9	+0.9	−0.3	−0.7	+0.6	−1.3	−0.3	−8.3
Ohio Valley and Tennessee	−1.2	−2.9	+1.0	−1.8	−1.2	−0.3	+0.9	+0.1	+1.6	−0.3	+0.6	+0.5	−3.0
Lower Lakes	−1.1	−1.7	+0.1	−0.5	−1.6	−0.2	+0.9	+0.6	−0.6	+2.3	−1.0	+0.4	−2.4
Upper Lakes	+0.7	−0.5	+0.1	−0.7	−0.8	−0.3	−0.7	+0.1	−0.1	0.0	+0.6	−0.1	−1.7
North Dakota	+0.3	−0.4	−0.5	−0.4	+2.9	+0.9	−1.0	+0.3	−0.1	−0.6	+0.7	+0.5	+2.6
Upper Mississippi Valley	+0.9	−0.4	+0.5	−1.1	+0.2	−1.2	−1.5	+1.4	+0.7	−0.9	+1.0	+0.1	−0.3
Missouri Valley	+0.2	−0.1	+0.6	−0.1	−1.2	−0.8	−1.3	+2.1	+1.5	+0.2	+0.2	0.0	+1.3
Northern Slope	−0.3	−0.1	+0.7	0.0	+0.9	−0.4	−0.6	+1.3	+0.6	+0.6	+0.4	+0.6	+3.7
Middle Slope	−0.3	−0.4	+0.3	+0.7	−1.8	−0.9	+1.0	+0.9	+2.5	+0.2	+0.4	−0.5	+2.1
Southern Slope	−0.3	−0.4	0.0	+1.7	−1.1	−0.1	+0.7	+2.7	+0.8	−0.1	+0.9	−0.6	+4.2
Southern Plateau	−0.3	−0.1	+1.4	+1.0	0.0	−0.3	+0.5	+0.7	+0.1	−0.4	+0.9	+1.6	+5.1
Middle Plateau	+0.7	−0.5	+1.3	+0.8	+0.8	−0.1	+0.2	+0.4	+0.4	−0.6	+0.6	+0.3	+4.3
Northern Plateau	−0.2	−0.2	+0.2	−0.7	+1.1	0.0	−0.5	+0.4	−0.4	−0.6	+0.6	+0.8	+0.5
North Pacific	−1.2	−0.6	−3.1	−2.7	−0.2	+1.0	−0.8	−0.7	+1.4	0.0	+1.6	−1.4	−6.7
Middle Pacific	0.0	+0.3	+4.0	−1.1	+1.1	+0.4	−0.1	−0.1	−0.4	−1.6	−1.7	+1.8	+2.6
South Pacific	+0.6	+0.1	+4.5	−0.6	+1.8	0.0	0.0	0.0	0.0	−0.6	−0.5	+1.3	+6.6

TABLE VIII.—*Monthly and annual departures of relative humidity from the normal, during 1906.*

Districts.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
New England	0	− 1	− 5	− 3	− 5	0	+5	0	− 3	+ 1	− 6	+ 1	− 1
Middle Atlantic	−2	− 3	+ 2	− 5	− 6	+4	+4	+ 8	+ 2	+ 3	− 4	+ 1	0
South Atlantic	+2	− 4	+ 1	− 8	− 1	+2	+4	+ 4	+ 4	0	− 4	− 2	0
Florida Peninsula	+3	+ 4	+ 1	0	+ 3	0	0	+ 2	− 3	+ 1	− 1	− 4	0
East Gulf	−3	− 6	+ 4	− 2	+ 2	−2	+3	+ 2	+10	+ 3	− 3	+ 1	+ 1
West Gulf	−5	− 2	+ 2	+ 2	− 1	−3	+3	+ 4	+ 6	0	− 1	+ 5	+ 1
Ohio Valley and Tennessee	−4	− 4	+ 6	− 1	− 2	+3	+7	+ 7	+ 8	+ 2	0	+ 4	+ 2
Lower Lakes	−4	− 3	+ 4	− 2	− 3	+2	+4	+ 4	0	+ 6	+ 1	+ 4	+ 1
Upper Lakes	0	− 3	− 1	− 2	− 1	+3	+1	+ 3	+ 1	+ 1	+ 1	0	0
North Dakota	+1	− 1	0	+ 1	+10	+7	+5	+10	+ 4	+ 2	+ 5	+ 7	+ 4
Upper Mississippi Valley	+4	+ 1	+ 5	− 1	− 1	0	0	+ 7	+ 5	0	+ 4	+ 6	+ 2
Missouri Valley	+1	− 3	+ 6	0	− 1	−2	+1	+ 7	+ 7	− 1	+ 2	+ 4	+ 2
Northern Slope	+5	0	+ 8	+ 2	+ 9	+5	+5	+11	+ 8	+ 7	+ 9	+ 9	+ 6
Middle Slope	−1	− 6	+15	+ 5	+ 2	0	+7	+10	+14	+ 7	+10	+ 4	+ 6
Southern Slope	−2	− 8	+10	+ 6	− 3	−4	+9	+11	+11	+ 9	+16	+10	+ 5
Southern Plateau	+4	+14	+12	+16	+ 8	−2	+9	+12	+ 6	− 1	+11	+19	+ 9
Middle Plateau	+5	+ 9	+10	+11	+ 4	+4	+9	+10	+10	0	+ 9	+ 6	+ 7
Northern Plateau	+4	+ 3	+ 4	− 4	+ 1	+5	0	− 2	− 6	− 8	+ 2	+ 5	0
North Pacific	+3	+ 1	− 6	− 4	+ 3	+1	0	− 5	+ 6	+ 2	0	+ 1	0
Middle Pacific	−3	+ 4	+ 2	− 2	+ 5	+7	+3	+ 1	− 5	−11	− 7	+ 3	0
South Pacific	−4	+ 8	+ 4	+ 3	+ 5	+1	+2	+ 2	− 1	−14	− 6	+ 7	+ 1

TABLE IX.—*Monthly and annual departures of average cloudiness from the normal, during 1906.*

Districts.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
New England	+0.2	−0.5	−0.1	0.0	−0.2	+0.4	+0.7	−0.2	−0.9	+0.5	+0.8	+1.6	+0.2
Middle Atlantic	+0.6	−1.0	+1.1	−0.7	−0.7	+0.7	+1.1	+1.4	0.0	+1.9	−0.7	+1.7	+0.4
South Atlantic	+0.7	−1.0	+0.8	−0.8	+0.1	+0.4	+1.4	+0.8	+0.2	+0.4	−1.3	+0.6	+0.2
Florida Peninsula	+1.4	+1.0	+0.8	−0.3	+0.5	−0.5	−0.1	+0.2	−1.4	−0.3	−0.3	−1.1	−0.1
East Gulf	+0.5	−0.7	+1.5	−0.1	+0.4	−0.1	+1.1	+0.5	+1.7	+1.1	−1.4	+0.6	+0.4
West Gulf	−0.7	−0.9	+0.7	+0.6	−0.1	−0.7	+0.9	+0.2	+0.7	+0.4	+0.5	+0.7	+0.2
Ohio Valley and Tennessee	+0.1	−1.5	+1.6	−0.9	−0.3	+0.4	+1.1	+1.1	+1.2	+1.0	0.0	+1.7	+0.5
Lower Lakes	−0.3	−0.8	+0.8	−0.6	+0.4	+0.4	+0.1	−0.1	−1.2	+0.8	−0.1	+1.1	0.0
Upper Lakes	+0.4	−0.4	+0.1	−0.6	+0.4	+0.1	−0.5	0.0	−0.8	+0.5	+0.6	+0.7	0.0
North Dakota	0.0	+0.6	0.0	−0.3	+1.4	+0.3	−0.4	+0.9	+0.1	+0.2	+1.2	+1.4	+0.4
Upper Mississippi Valley	+0.8	−0.5	+1.6	−0.7	−0.1	0.0	−0.2	+0.7	+0.4	+1.3	+1.6	+1.7	+0.6
Missouri Valley	−0.1	−0.7	+1.2	−0.3	0.0	−0.1	−0.3	+0.6	+0.1	+0.9	+1.4	+1.7	+0.4
Northern Slope	+0.1	+0.1	−0.1	−0.9	+0.2	0.0	−0.9	+0.3	−0.5	+0.5	+1.2	+1.8	+0.2
Middle Slope	+0.4	−0.2	+2.0	+0.4	0.0	+0.5	+0.7	+0.4	+1.1	+0.9	+2.0	+0.7	+0.7
Southern Slope	+0.4	+0.2	+0.4	+0.8	−0.1	−1.0	+1.2	0.0	+0.8	+0.9	+2.4	+0.2	+0.5
Southern Plateau	+0.7	+1.5	+0.6	+1.1	+0.2	−0.4	+0.4	+0.4	−0.4	−0.2	+1.0	+1.3	+0.5
Middle Plateau	+1.4	+0.9	+0.6	+0.7	+0.3	0.0	+0.6	+1.4	+0.5	−0.5	+1.7	+1.0	+0.7
Northern Plateau	+0.1	−0.2	−0.9	−2.1	−0.2	−0.4	−0.6	+0.1	−0.7	−0.3	+1.4	+1.3	−0.2
North Pacific	+1.0	−0.7	+0.1	−0.4	+0.9	+0.4	−0.1	+0.5	+0.3	+1.0	+0.8	+0.9	+0.4
Middle Pacific	+0.7	+2.1	+1.6	−0.5	+0.7	+1.2	+0.2	+1.2	+0.3	−0.4	+0.2	+1.3	+0.7
South Pacific	−0.4	+1.9	+1.3	−0.1	+0.6	−0.7	−0.4	+0.1	−0.5	−1.3	0.0	+1.4	+0.2

Chart I. Hydrographs for Seven Principal Rivers of the United States, January, 1906.

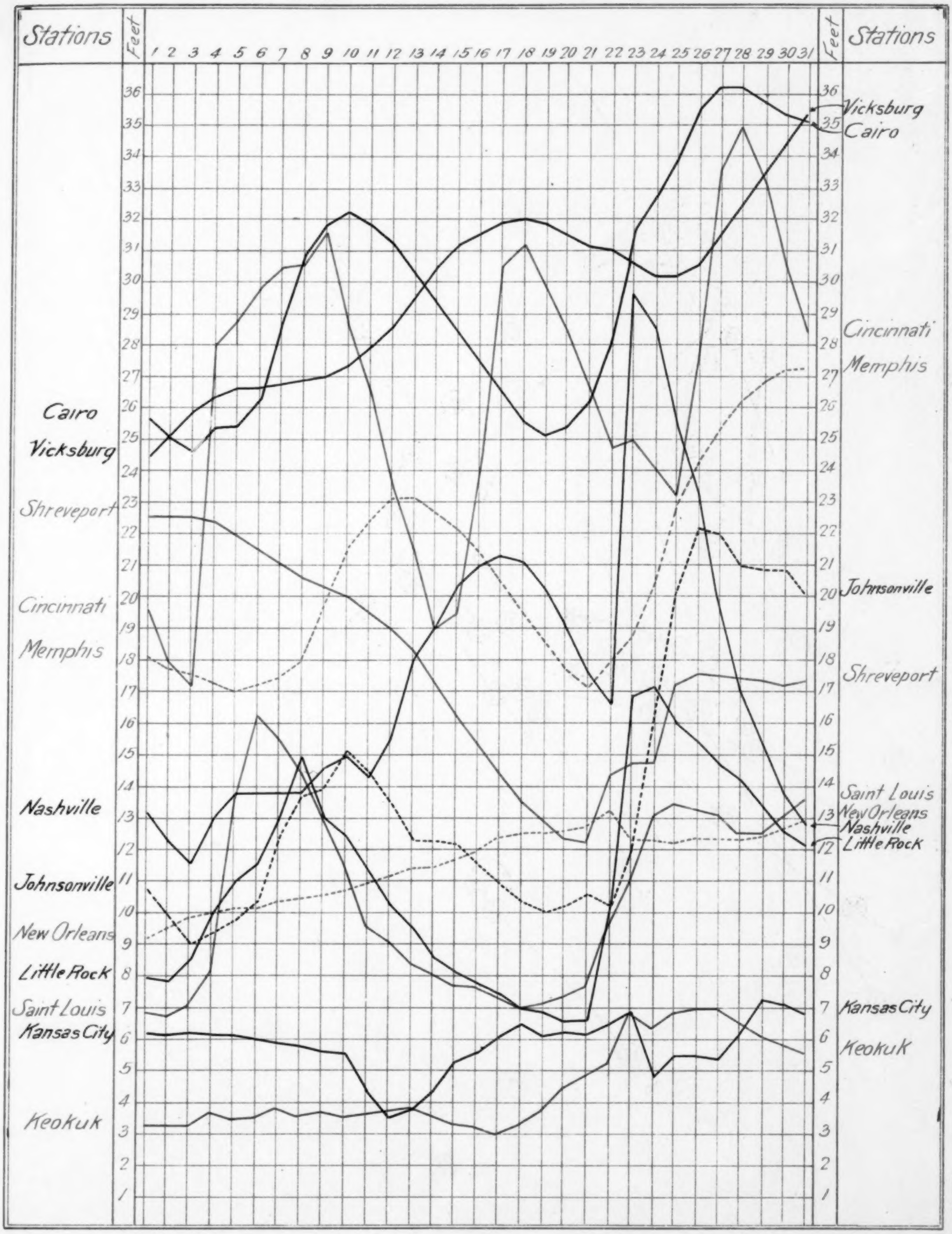

Chart II. Tracks of Centers of High Areas, January, 1906.

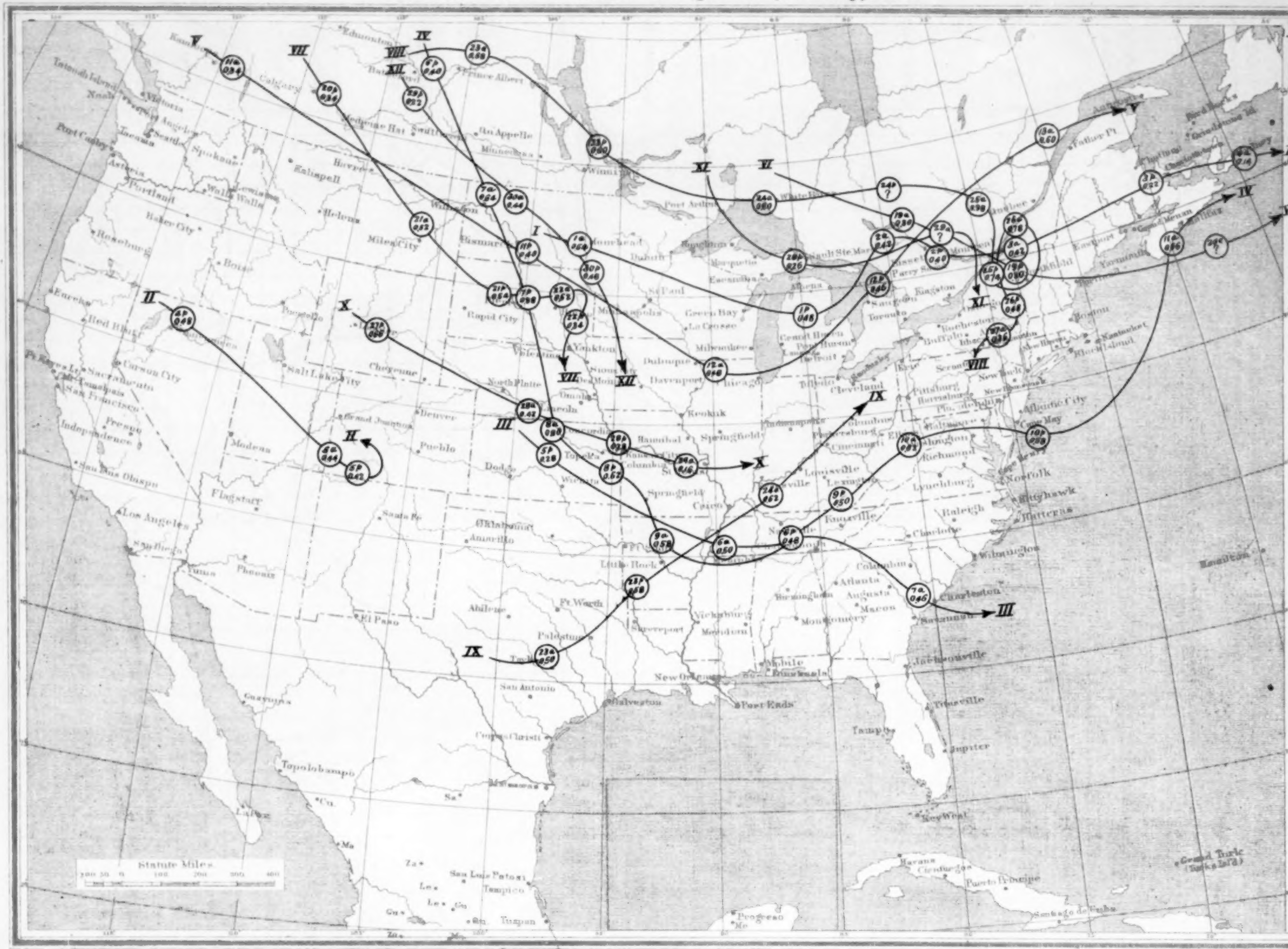

Chart III. Tracks of Centers of Low Areas, January, 1906.

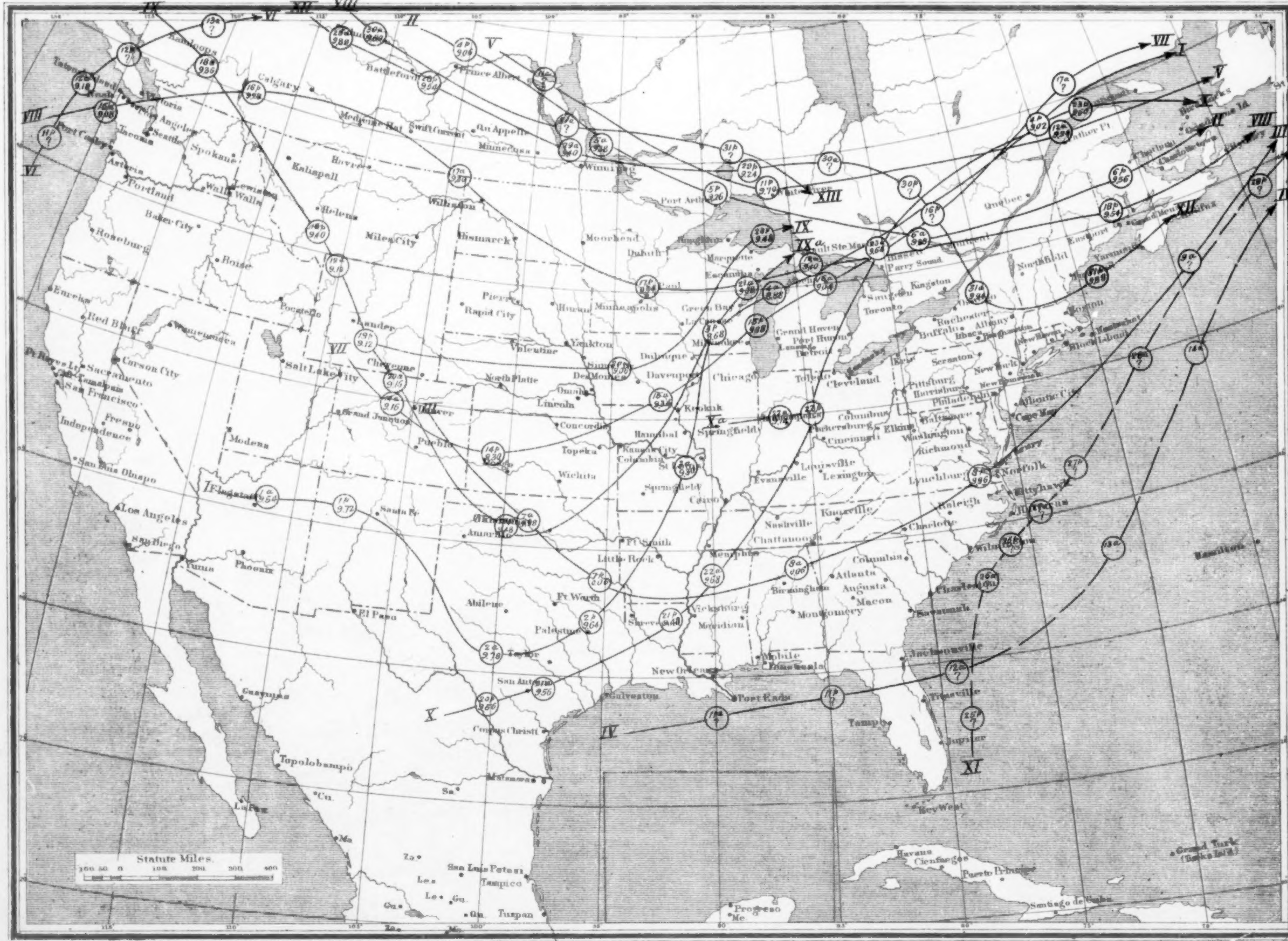

Chart IV. Total Precipitation, January, 1906.

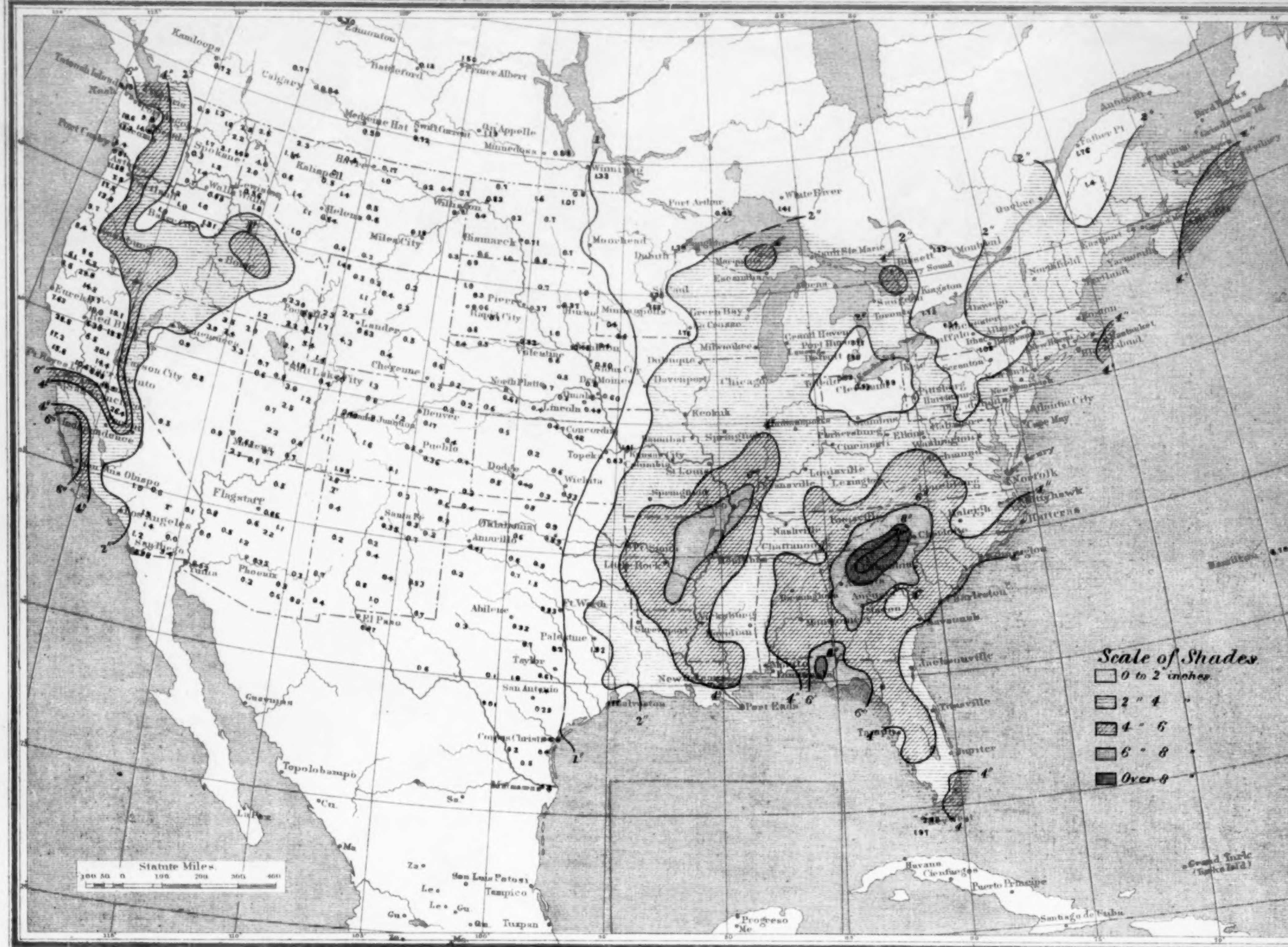

Chart V. Percentage of Clear Sky between Sunrise and Sunset, January, 1906.

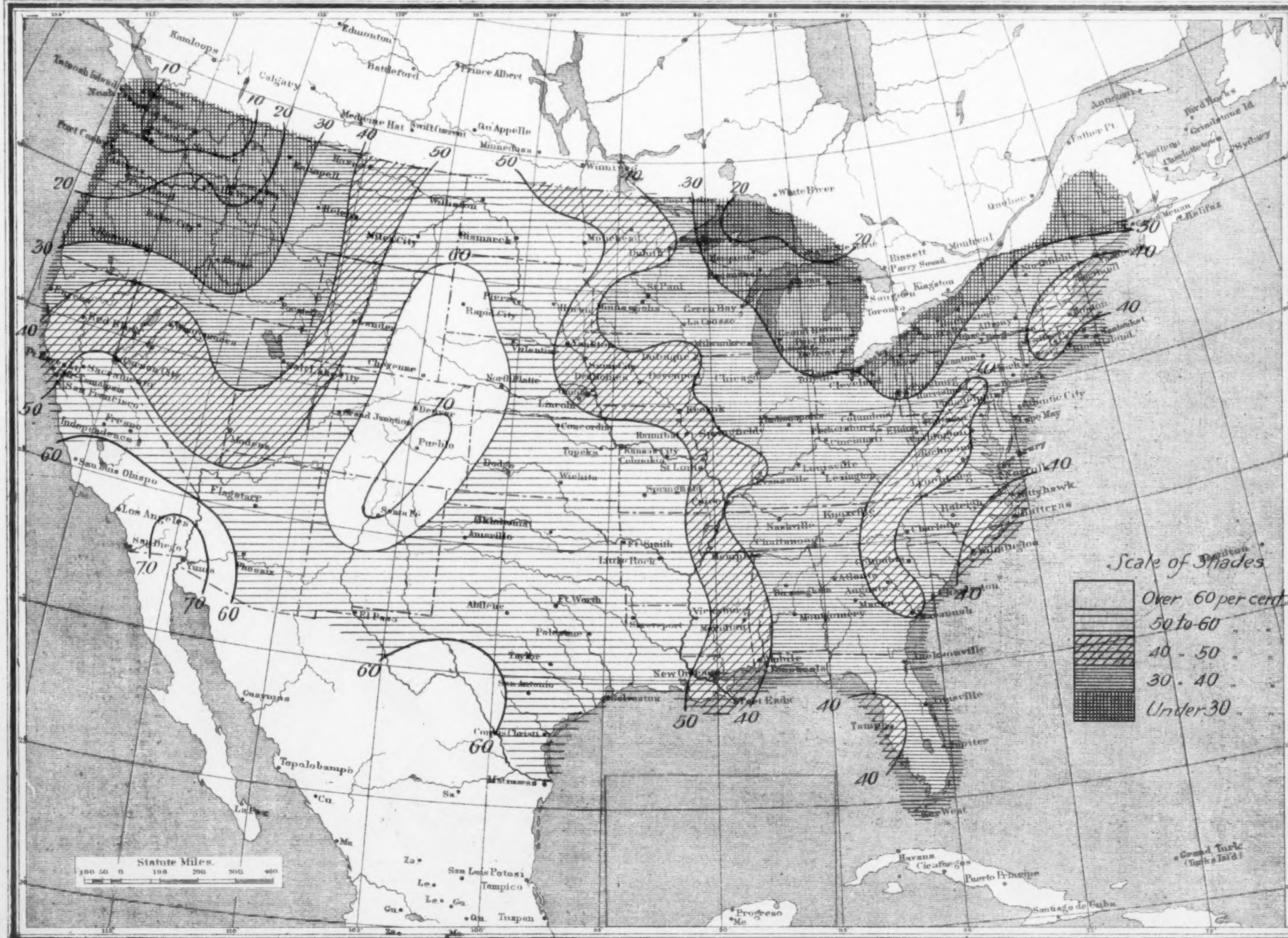

Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, January, 1906.

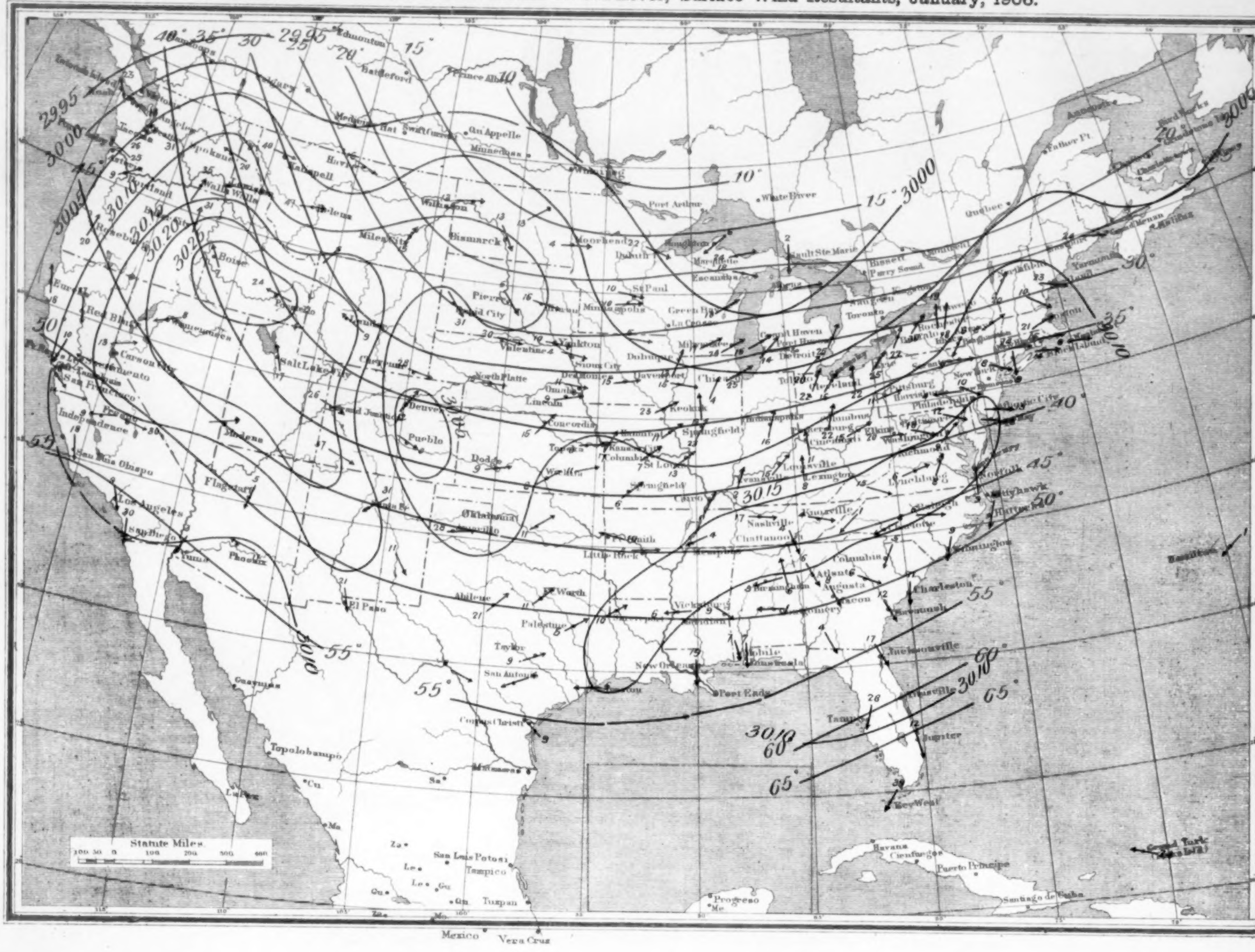

Chart VII. Total Snowfall for January, 1906,

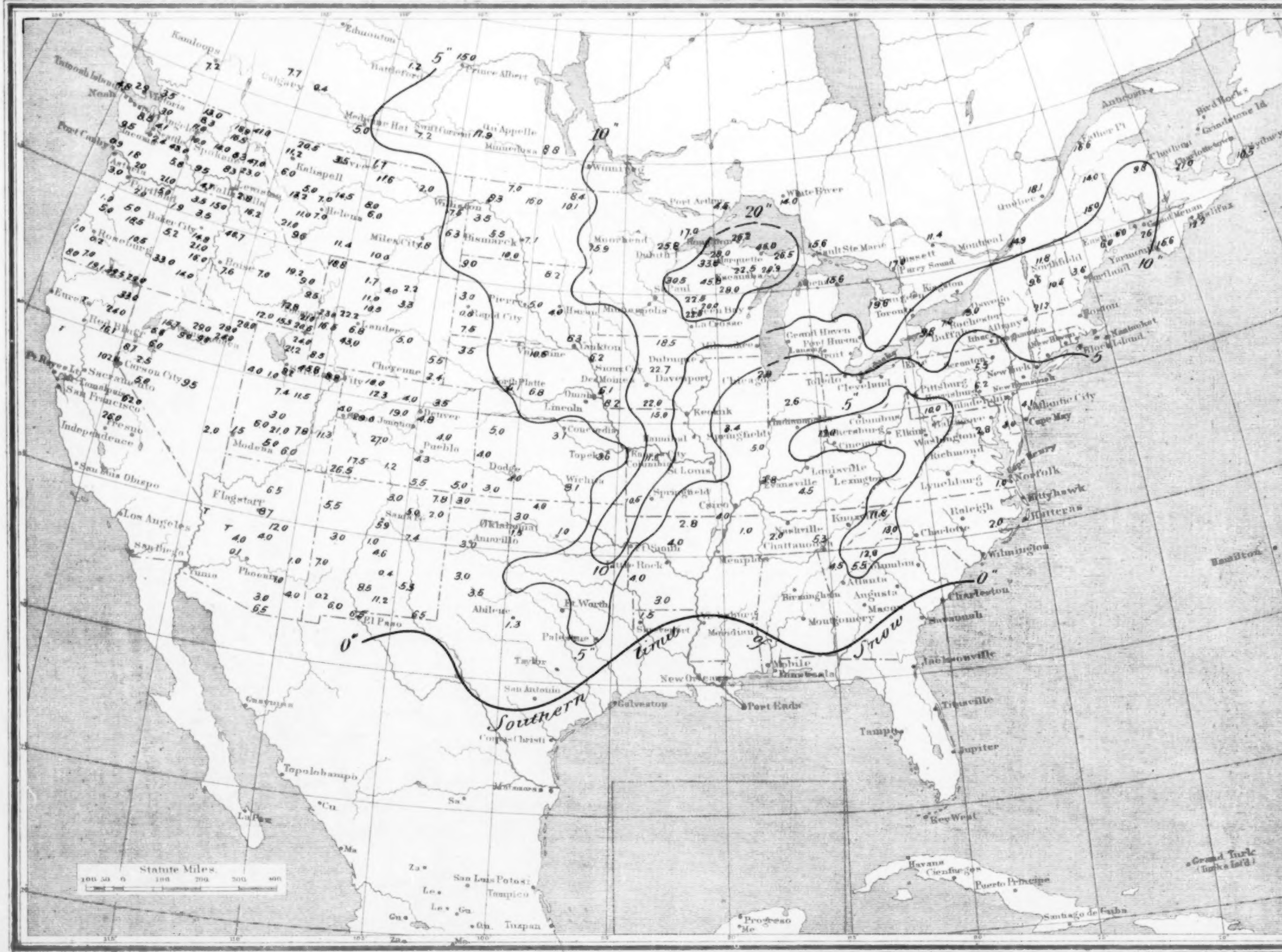

Chart VIII. Depth of Snow on ground January 31, 1906.

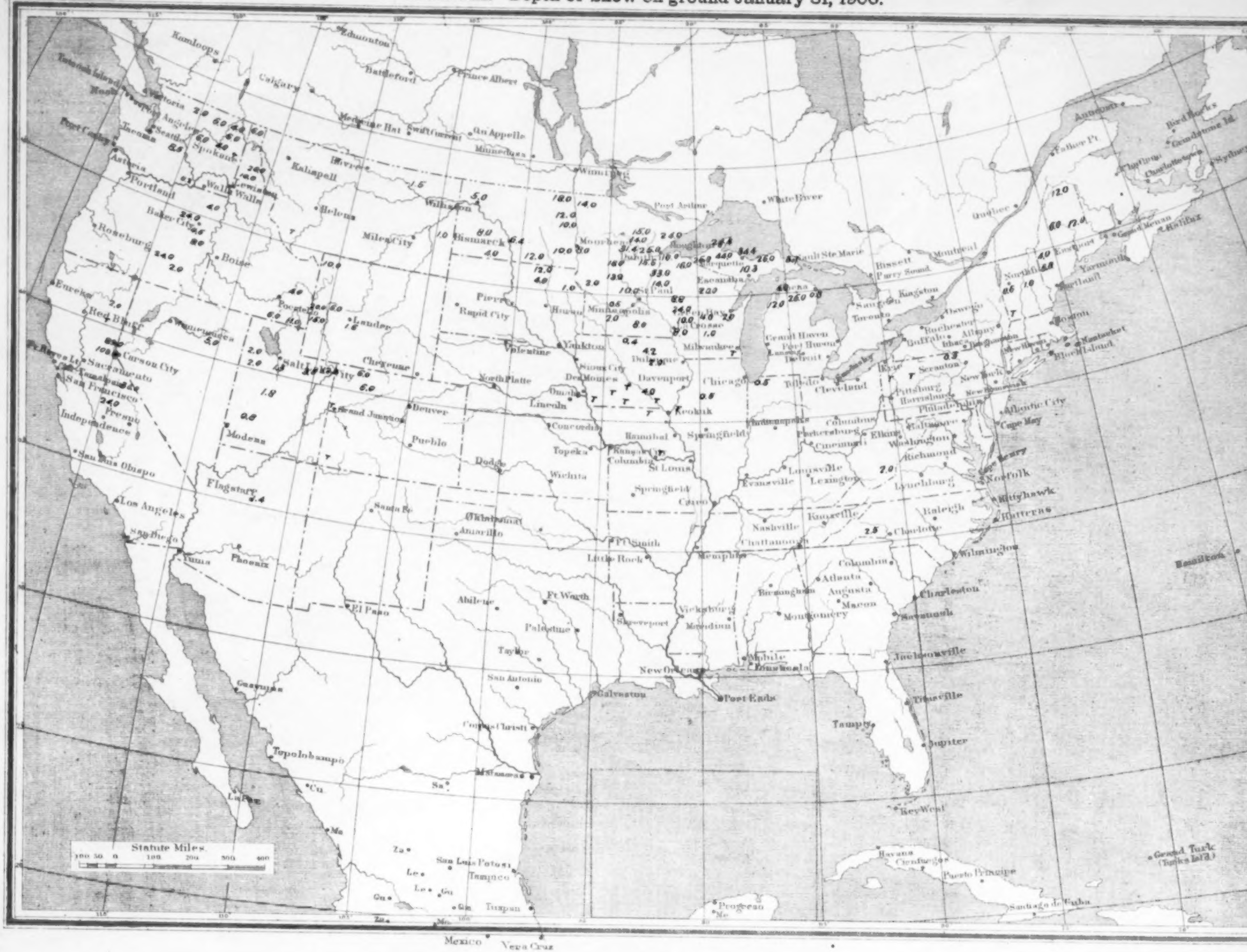

Chart I. Hydrographs for Seven Principal Rivers of the United States, February, 1906.

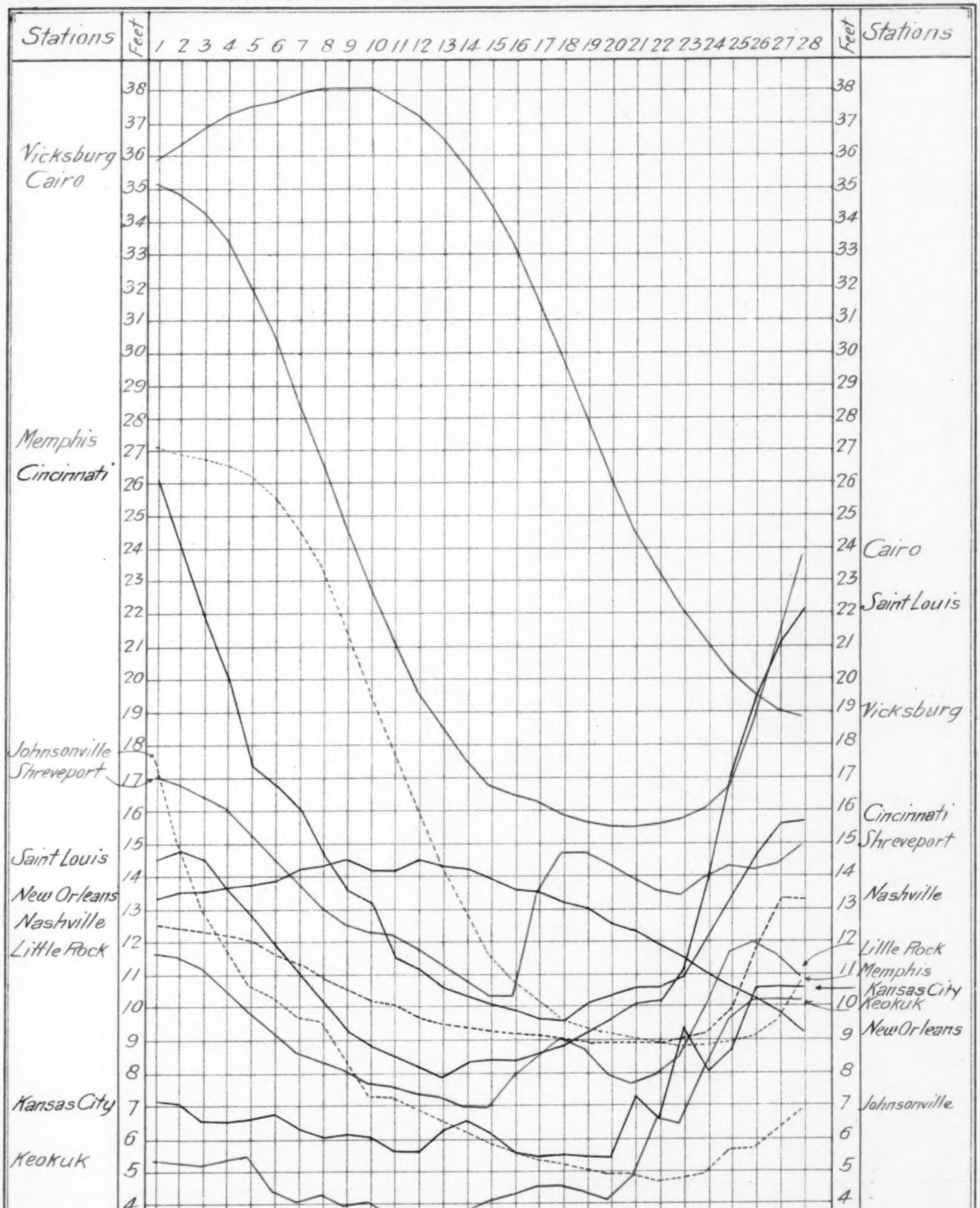

Chart II. Tracks of Centers of High Areas, February, 1906.

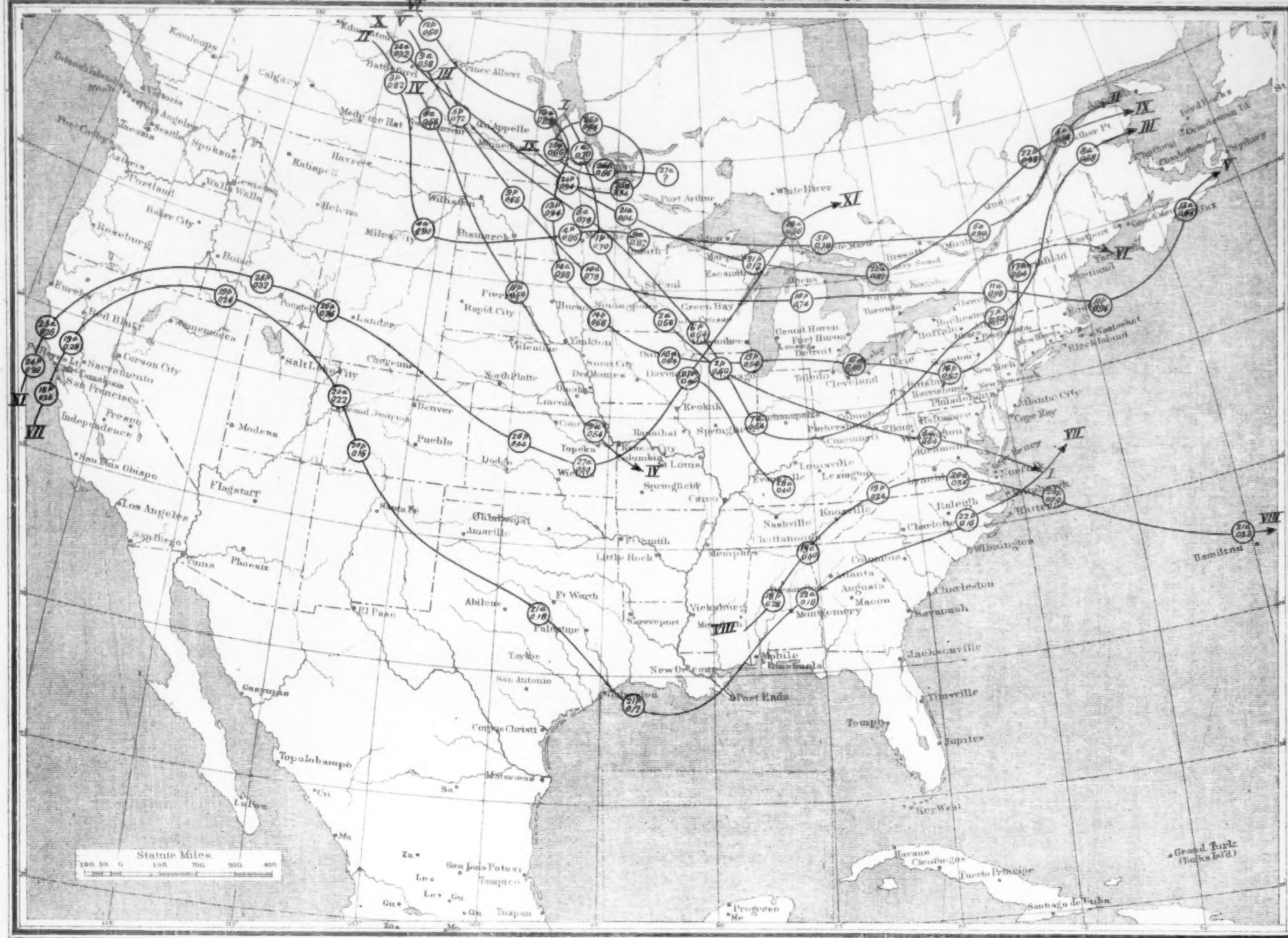

Chart III. Tracks of Centers of Low Areas, February, 1906.

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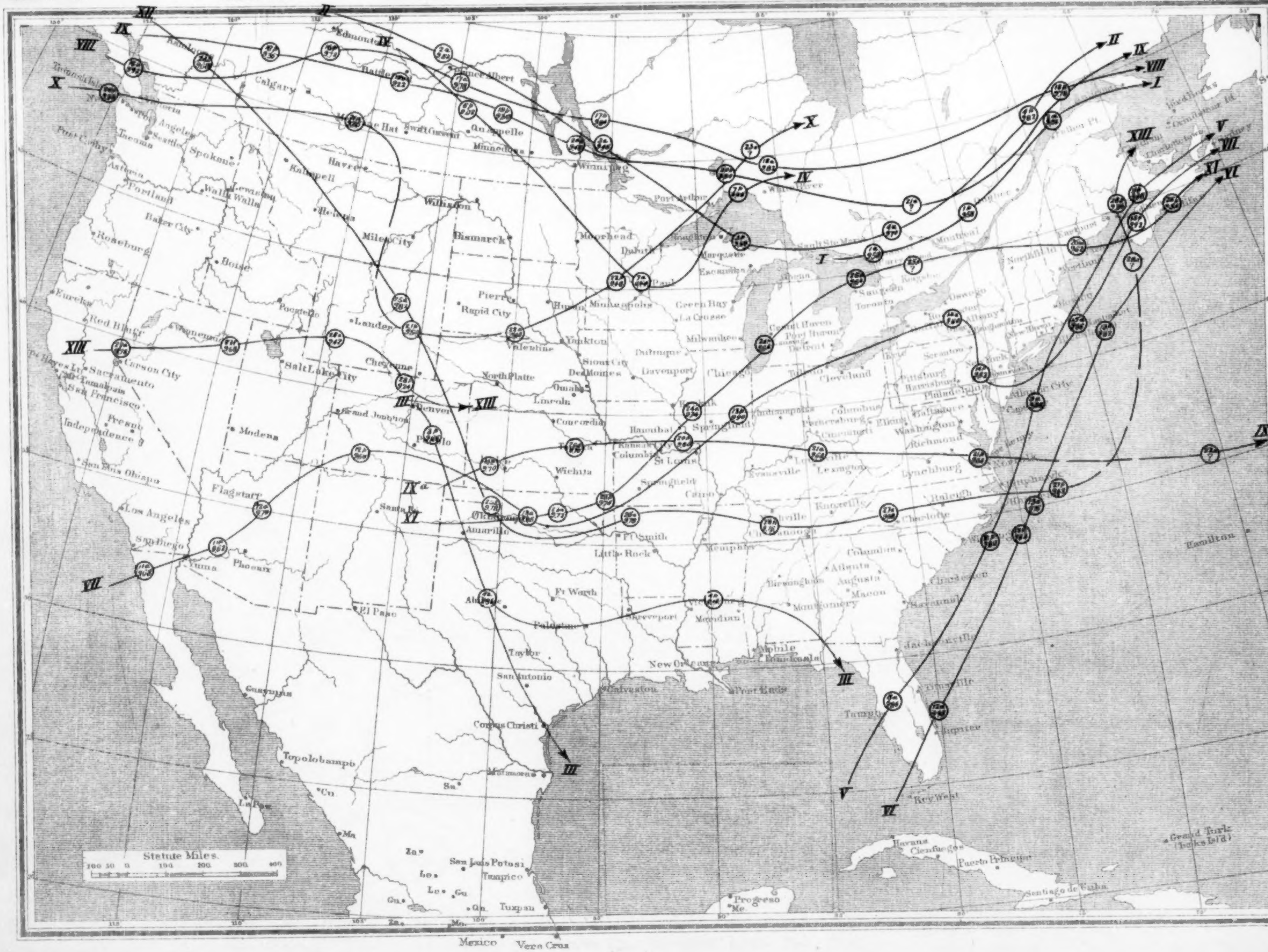

Chart IV. Total Precipitation, February, 1906.

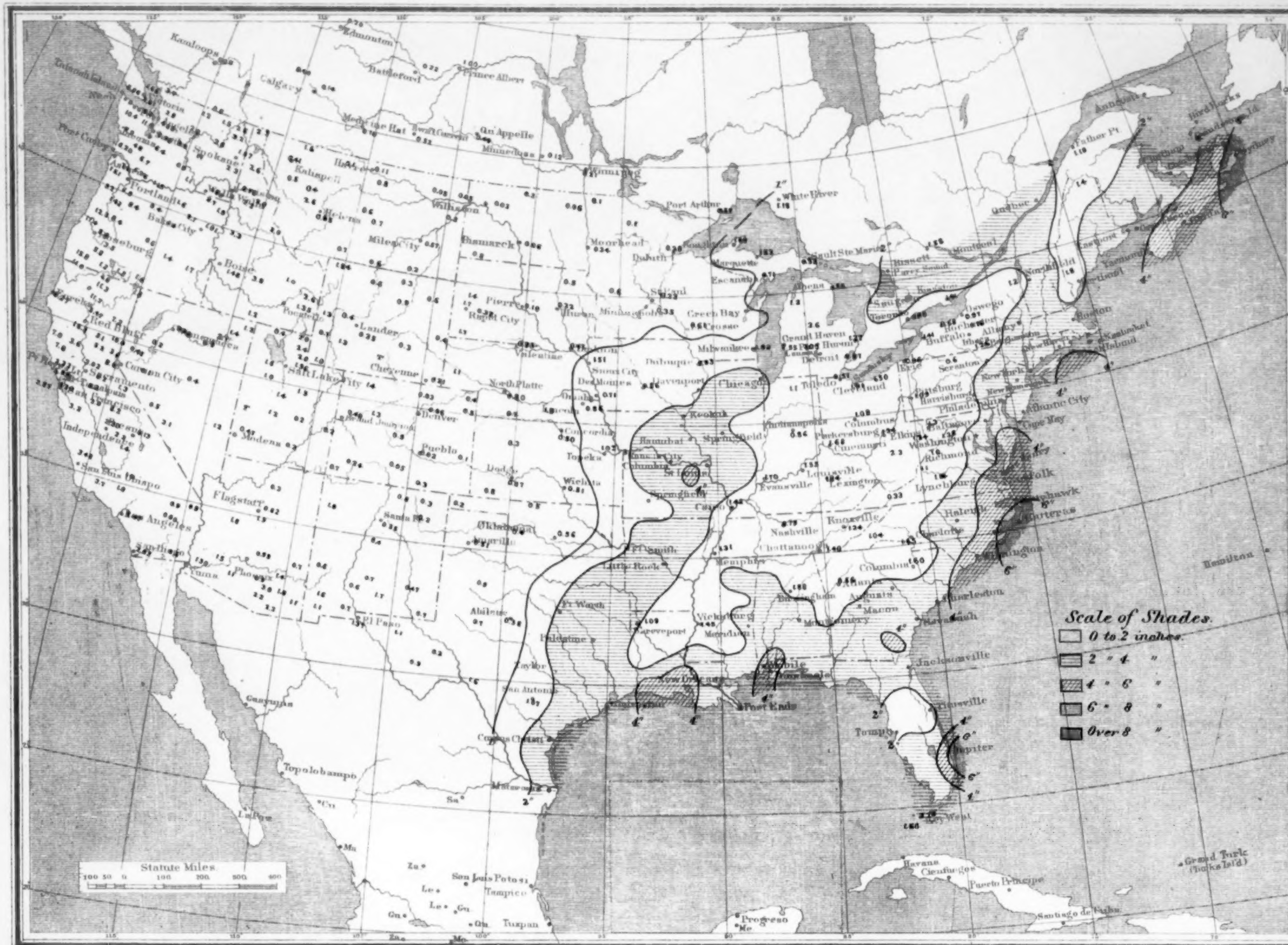

Chart V. Percentage of Clear Sky between Sunrise and Sunset, February, 1906.

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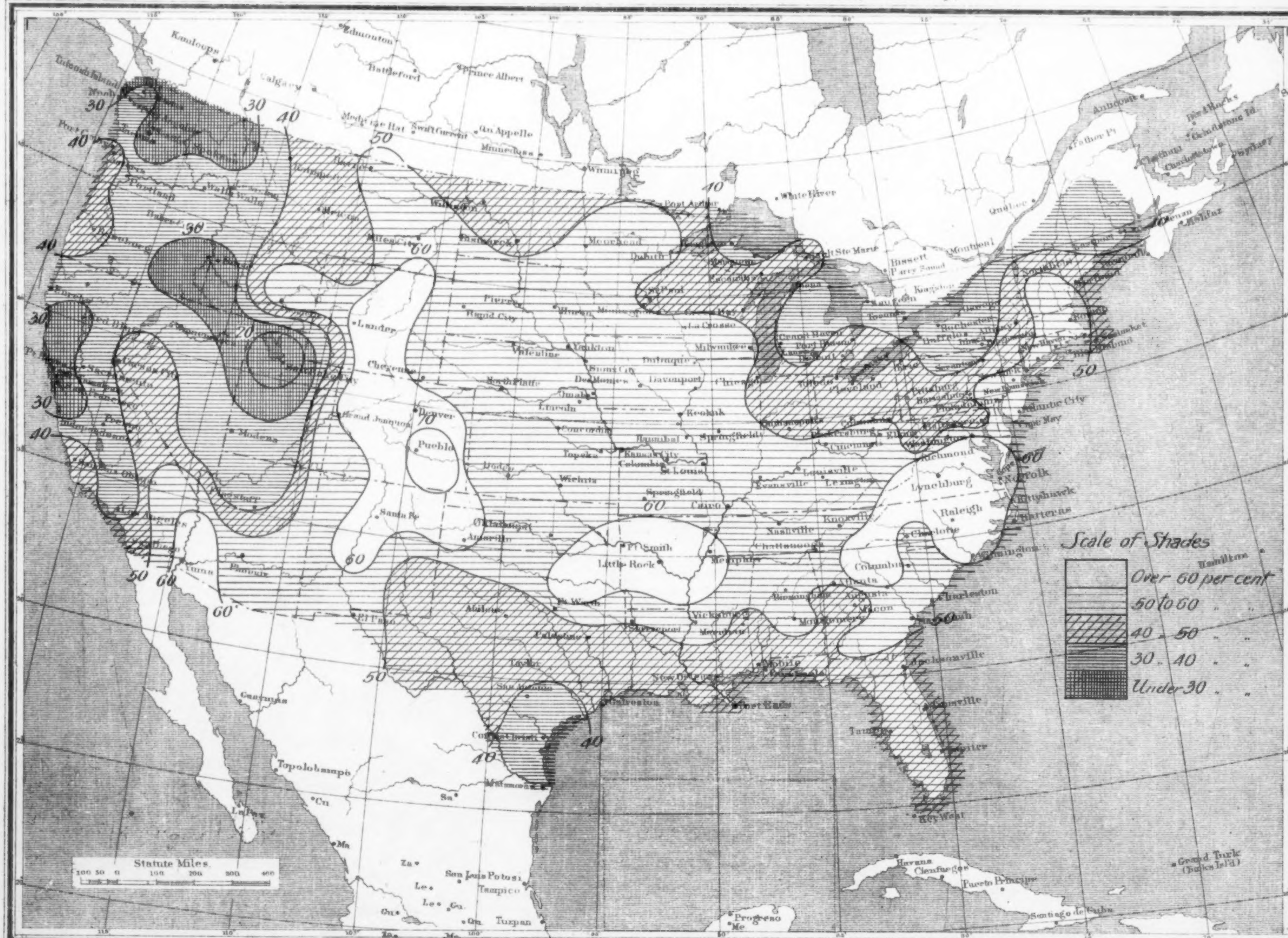


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, February, 1906.

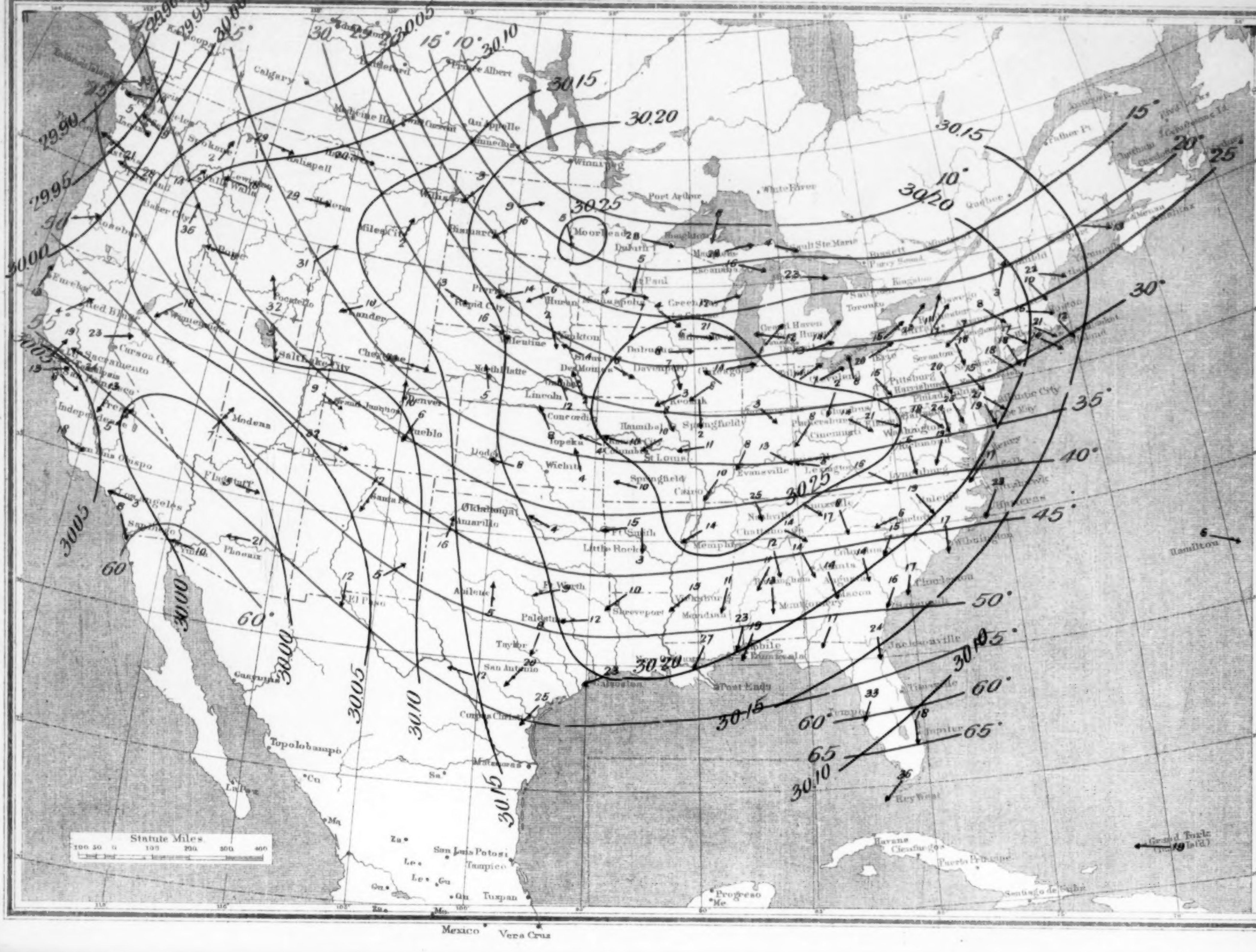


Chart VII. Total Snowfall for February, 1906.

Chart VII. Total Snowfall for February, 1906.

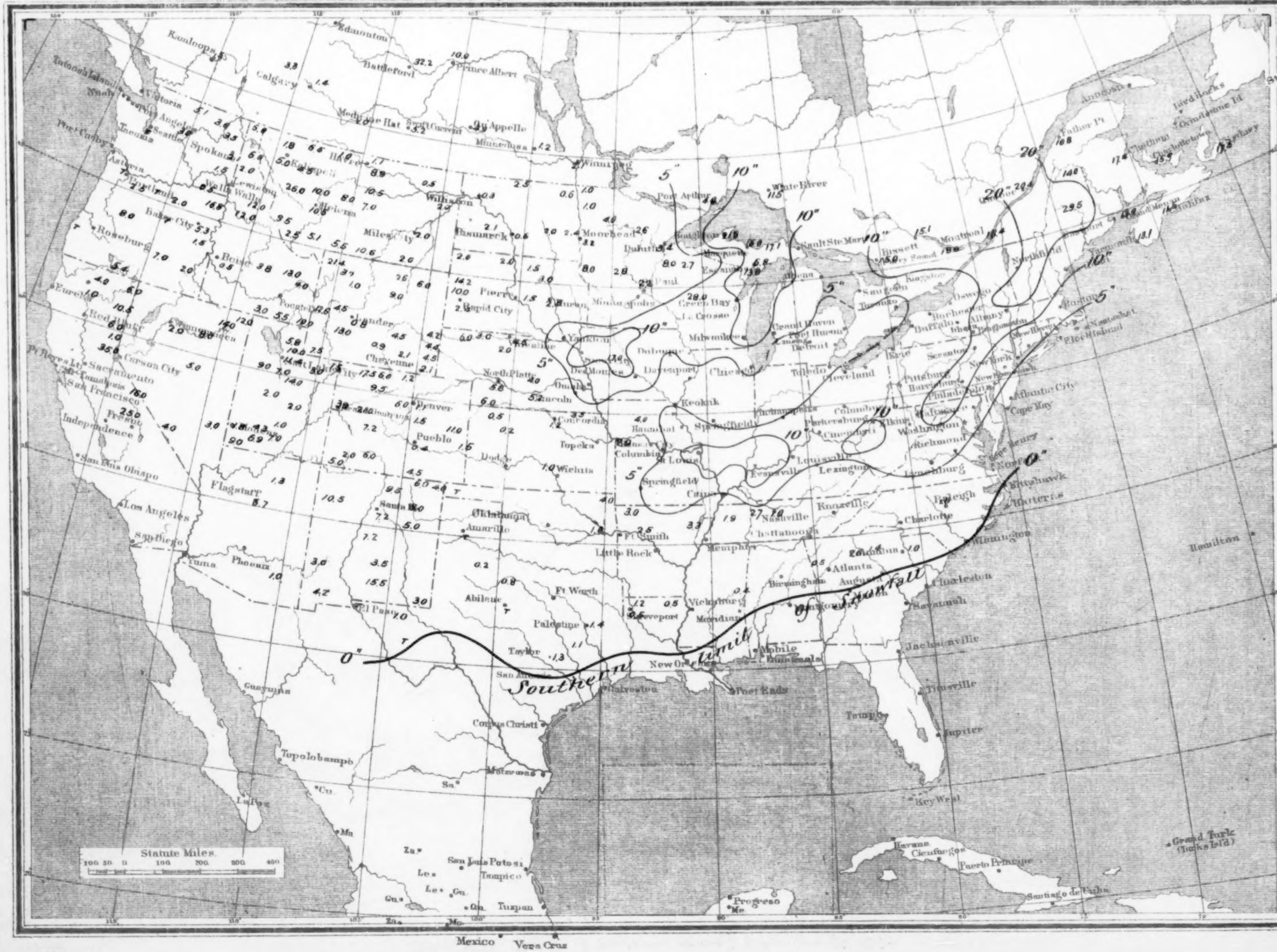
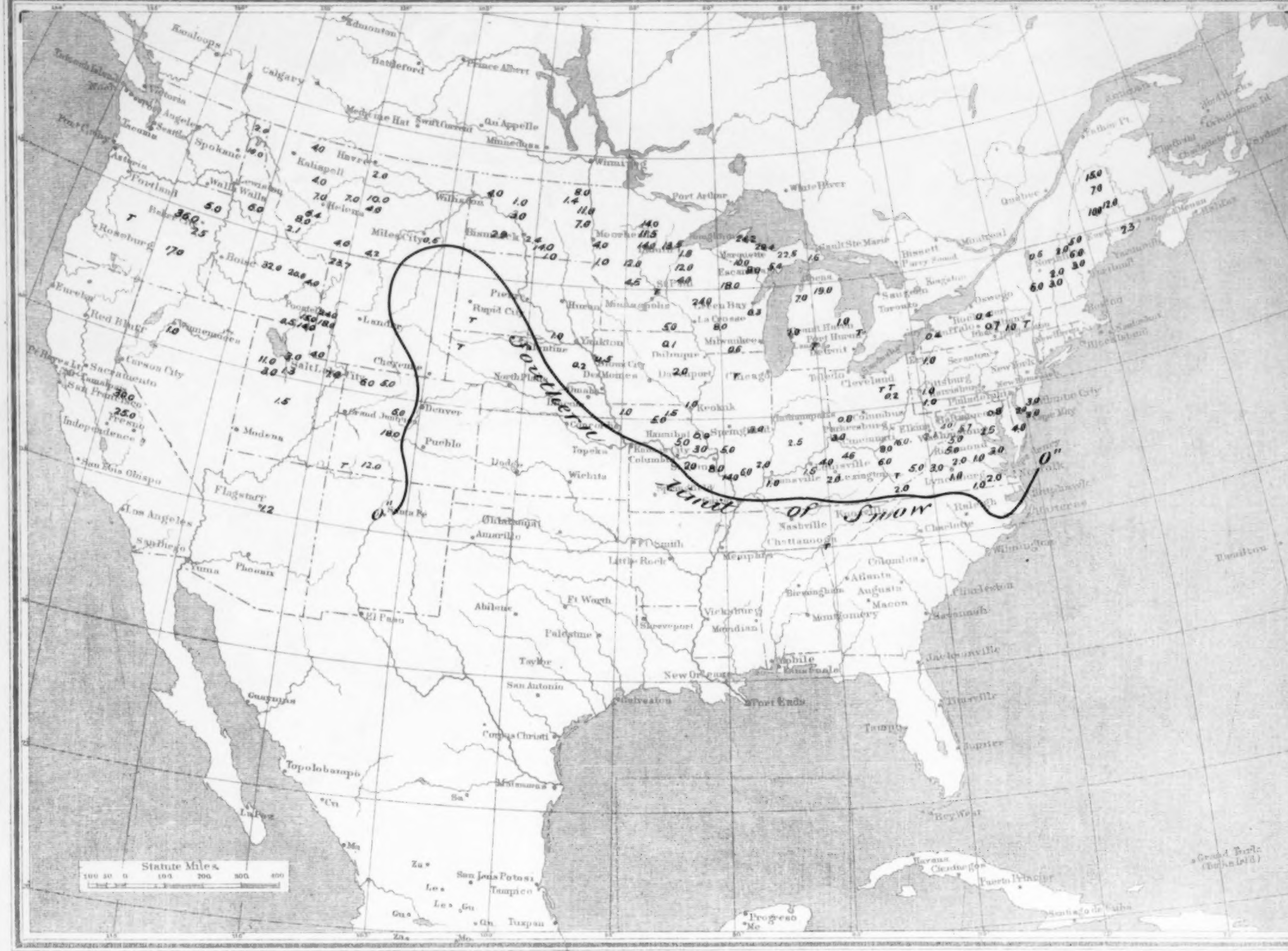
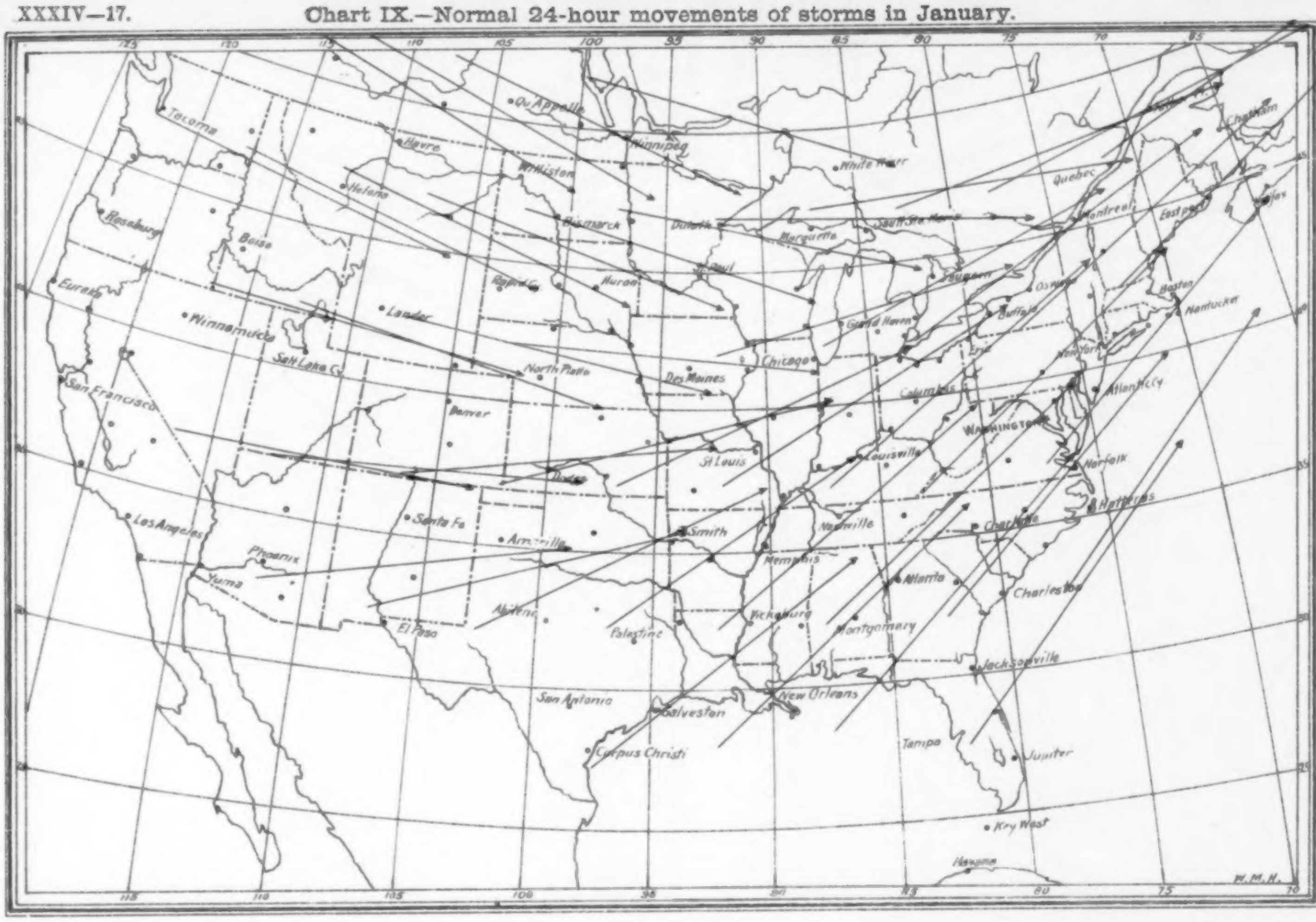


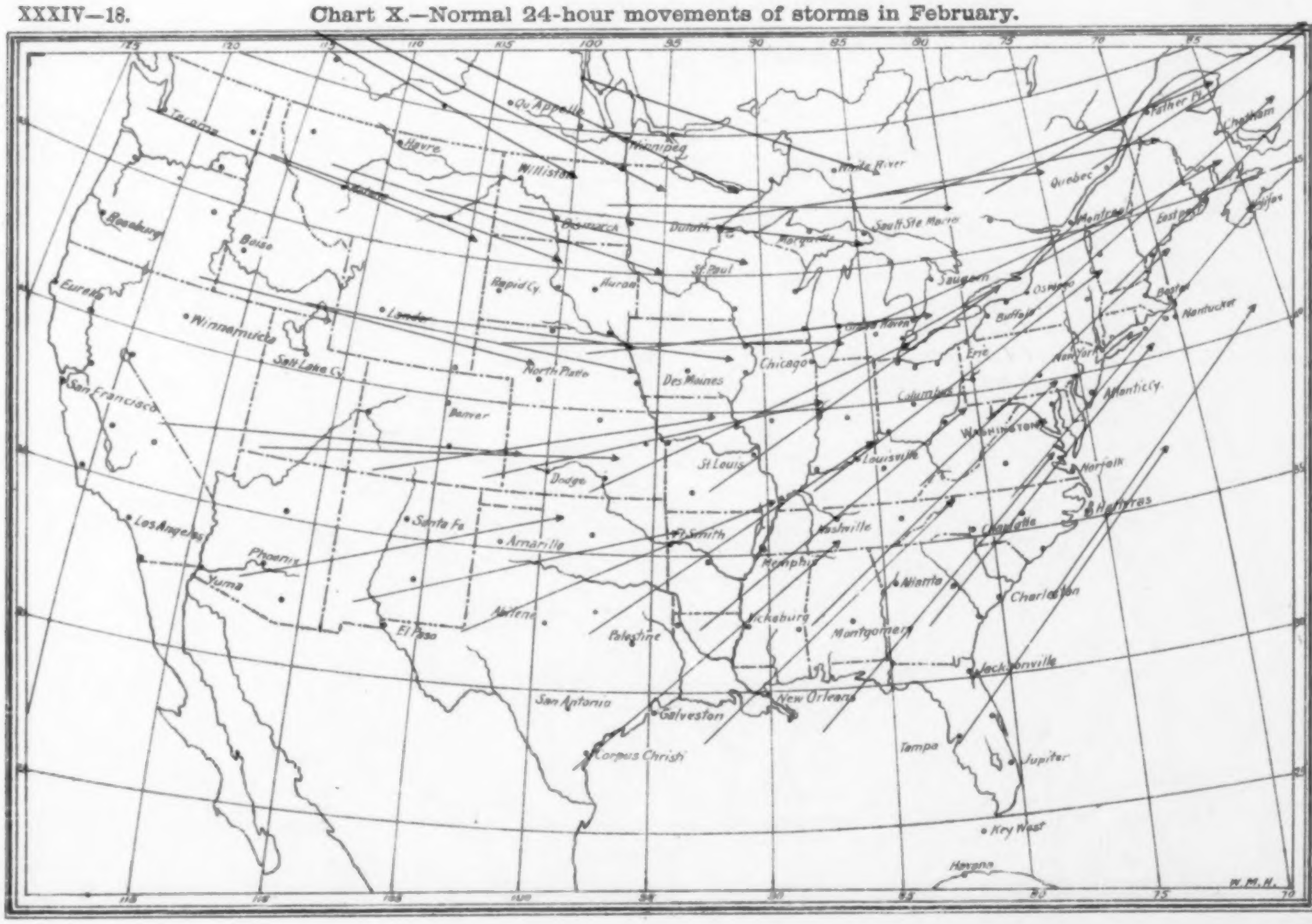
Chart VIII. Depth of Snow on ground February 28, 1906.



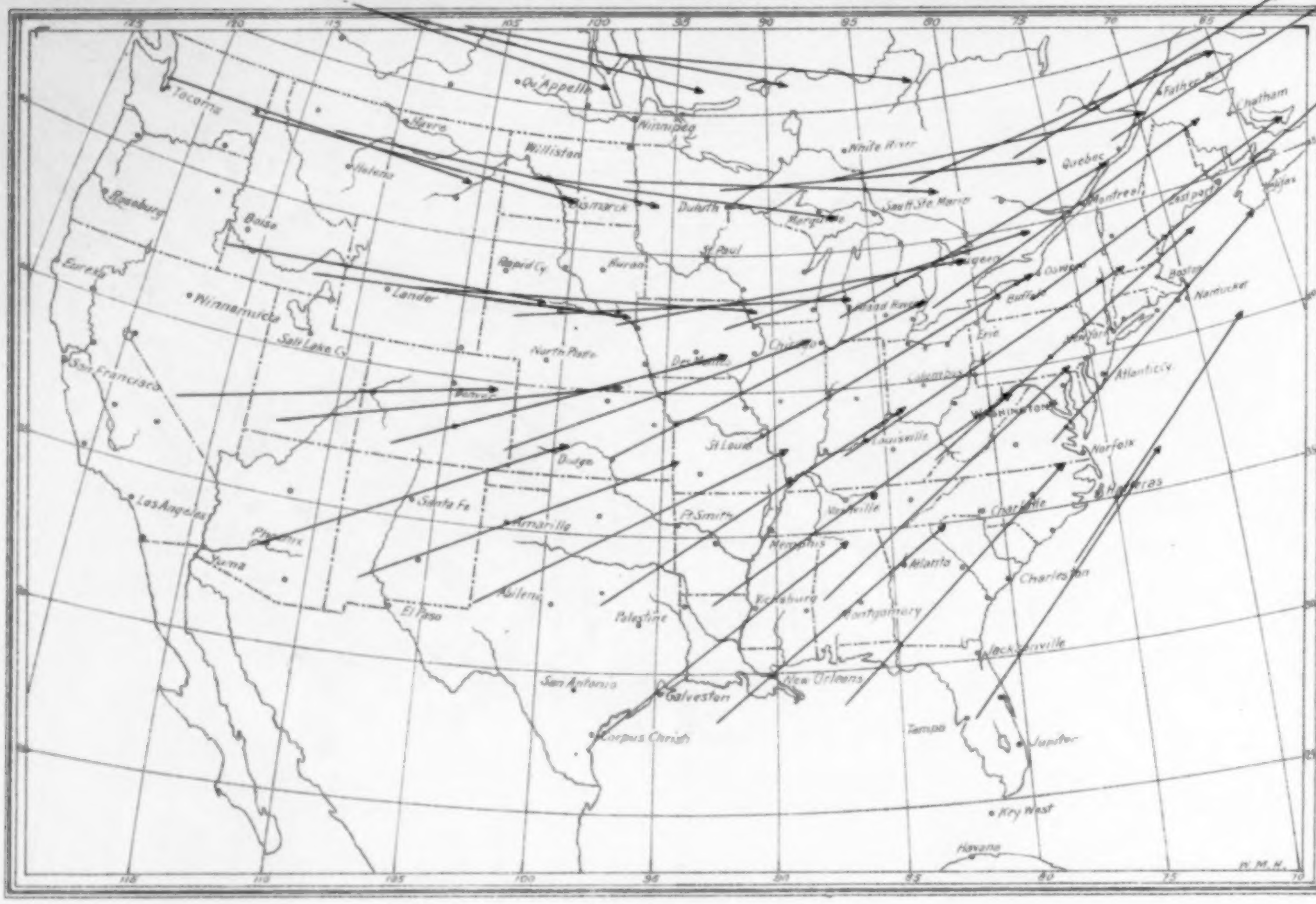
XXXIV—17. **Chart IX.—Normal 24-hour movements of storms in January.**



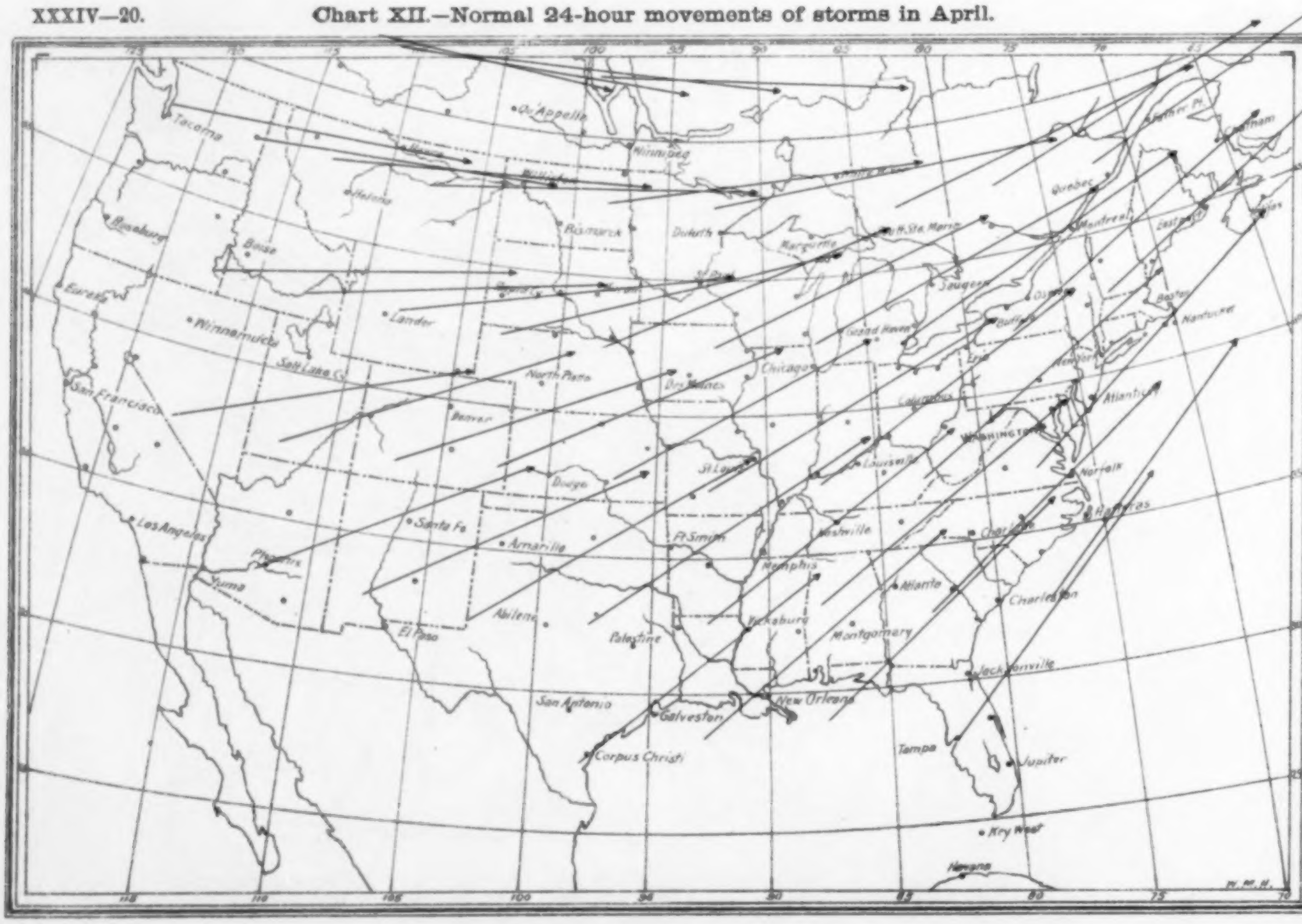
XXXIV—18. **Chart X.—Normal 24-hour movements of storms in February.**



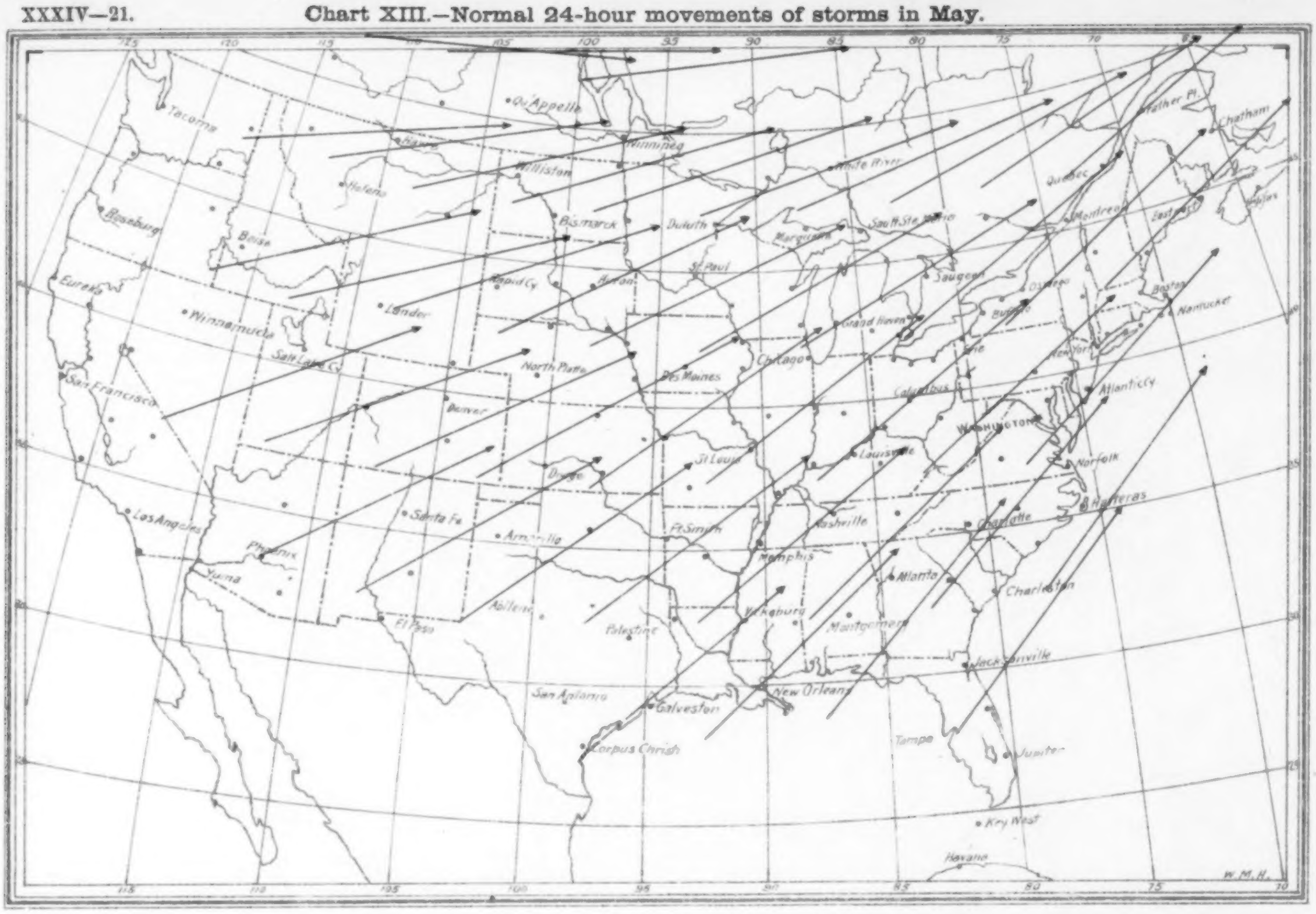
XXXIV—19. **Chart XI.—Normal 24-hour movements of storms in March.**



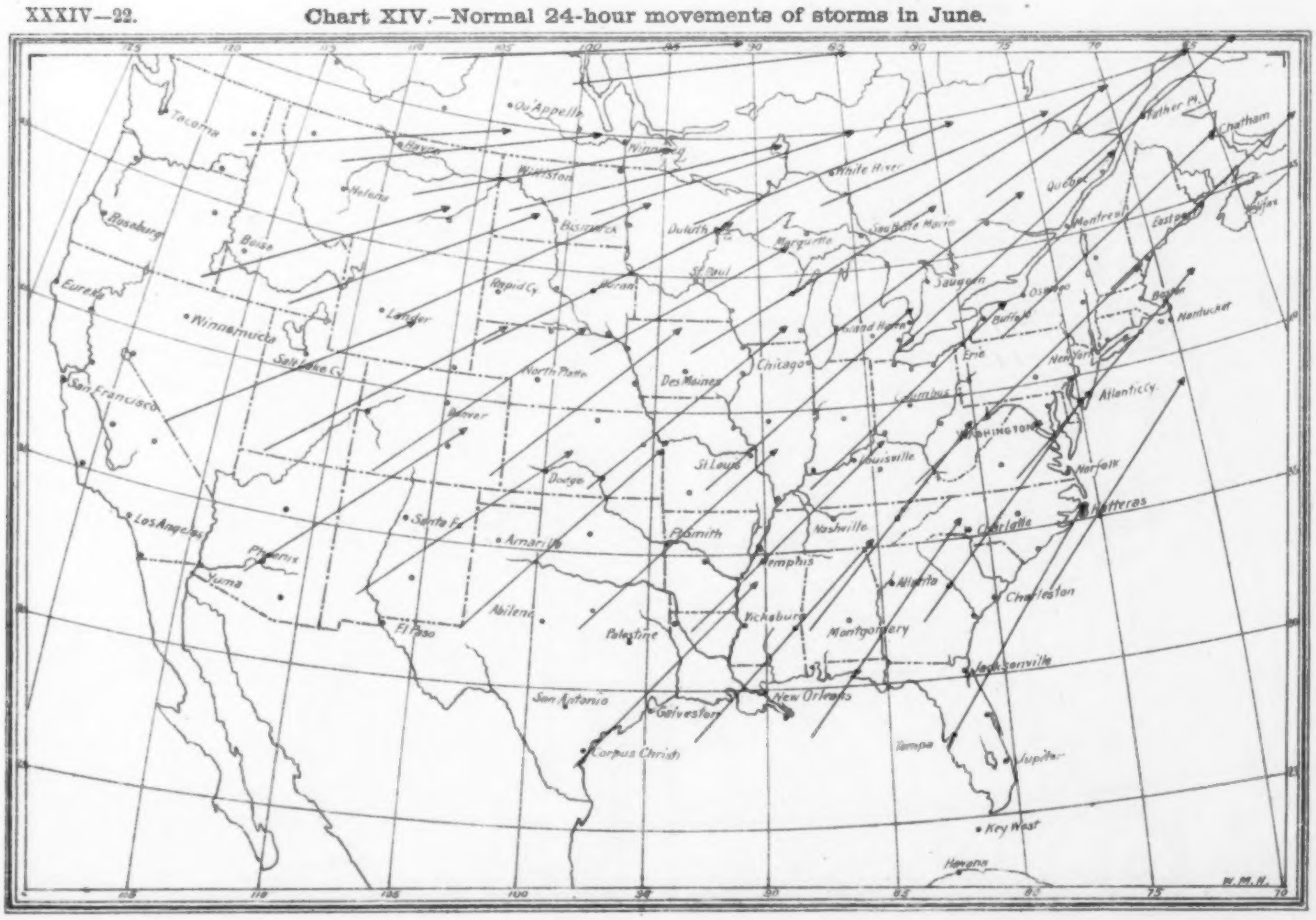
XXXIV—20. **Chart XII.—Normal 24-hour movements of storms in April.**



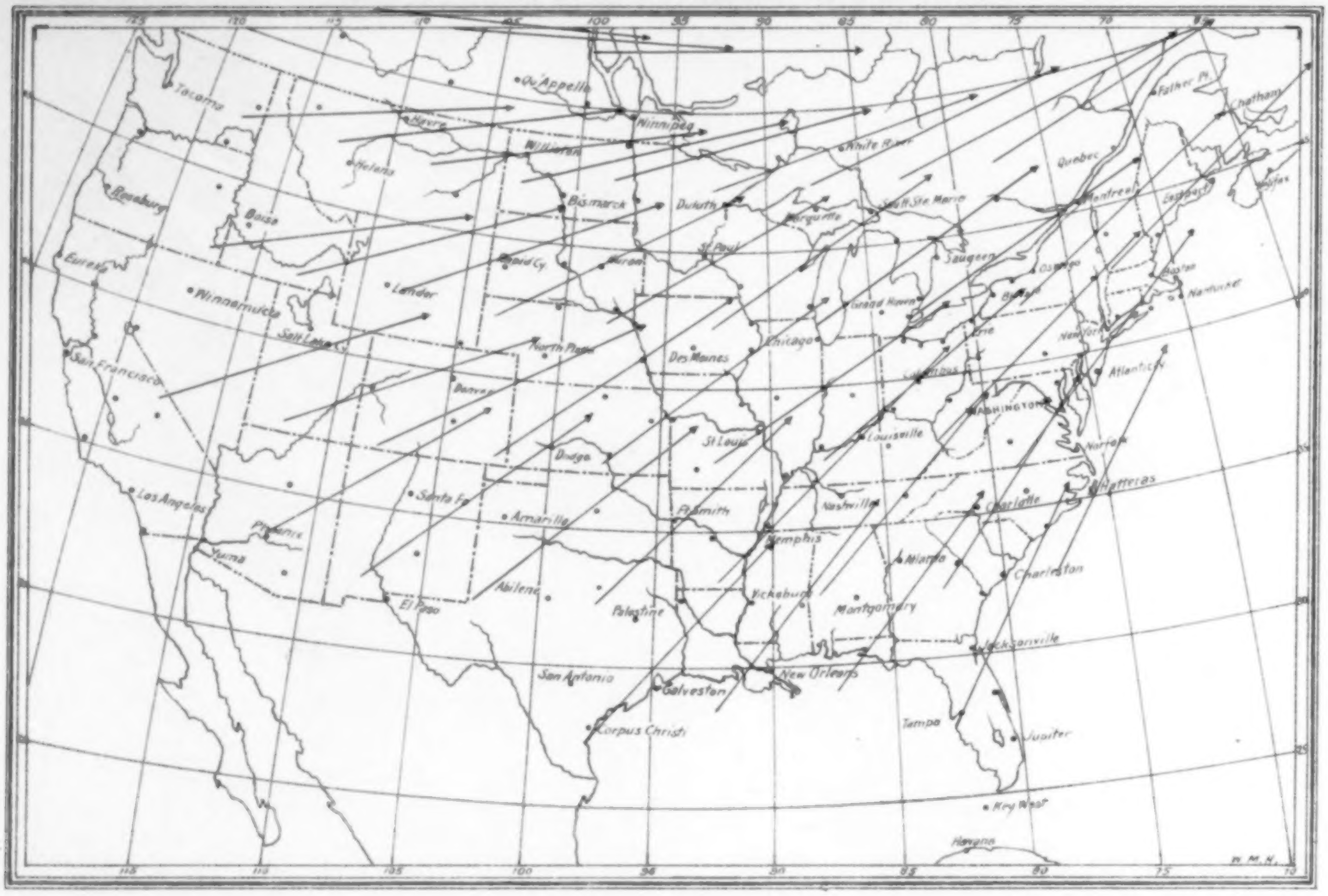
XXXIV—21. **Chart XIII.—Normal 24-hour movements of storms in May.**



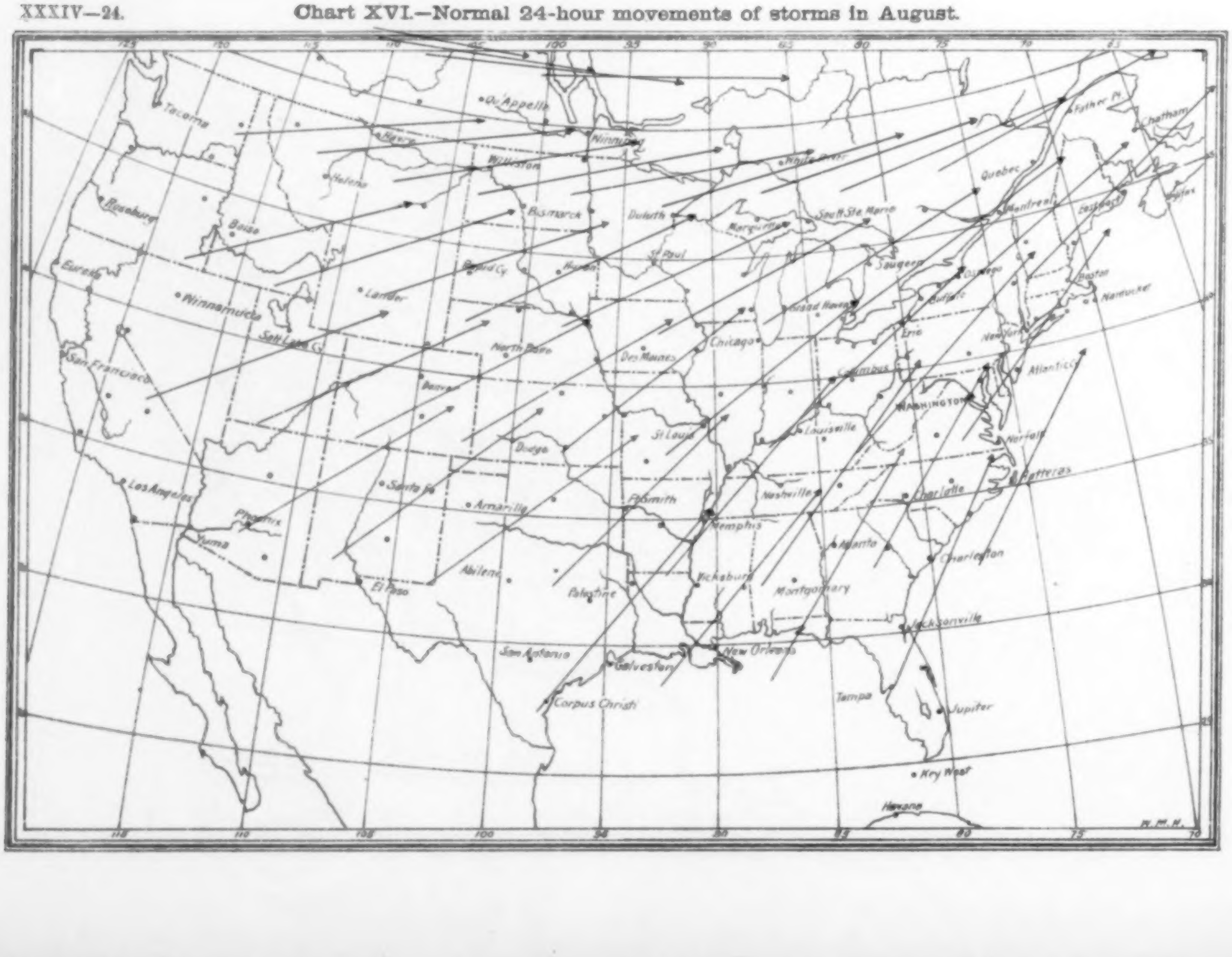
XXXIV—22. **Chart XIV.—Normal 24-hour movements of storms in June.**



XXXIV—23. Chart XV.—Normal 24-hour movements of storms in July.

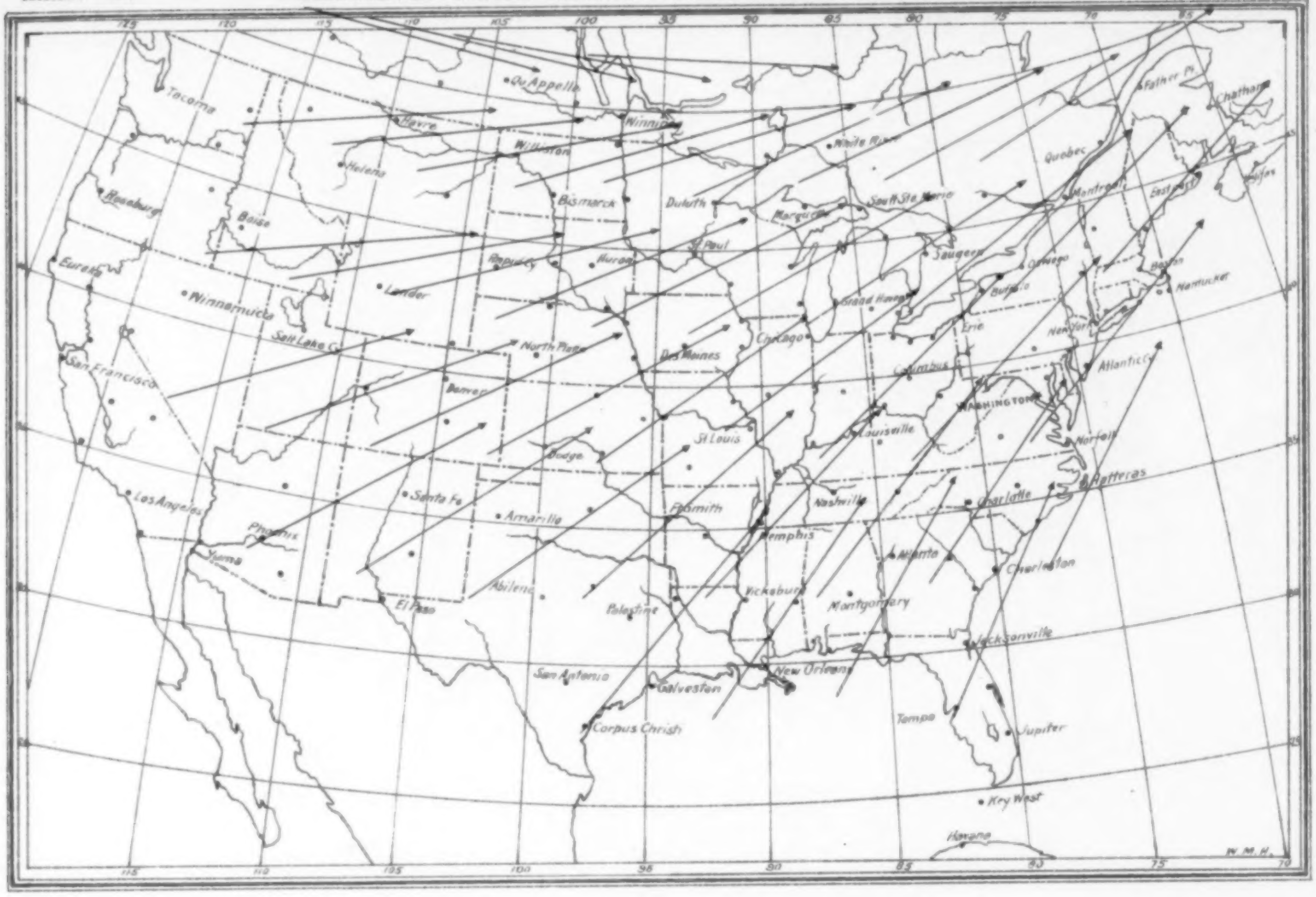


XXXIV—24. Chart XVI.—Normal 24-hour movements of storms in August.



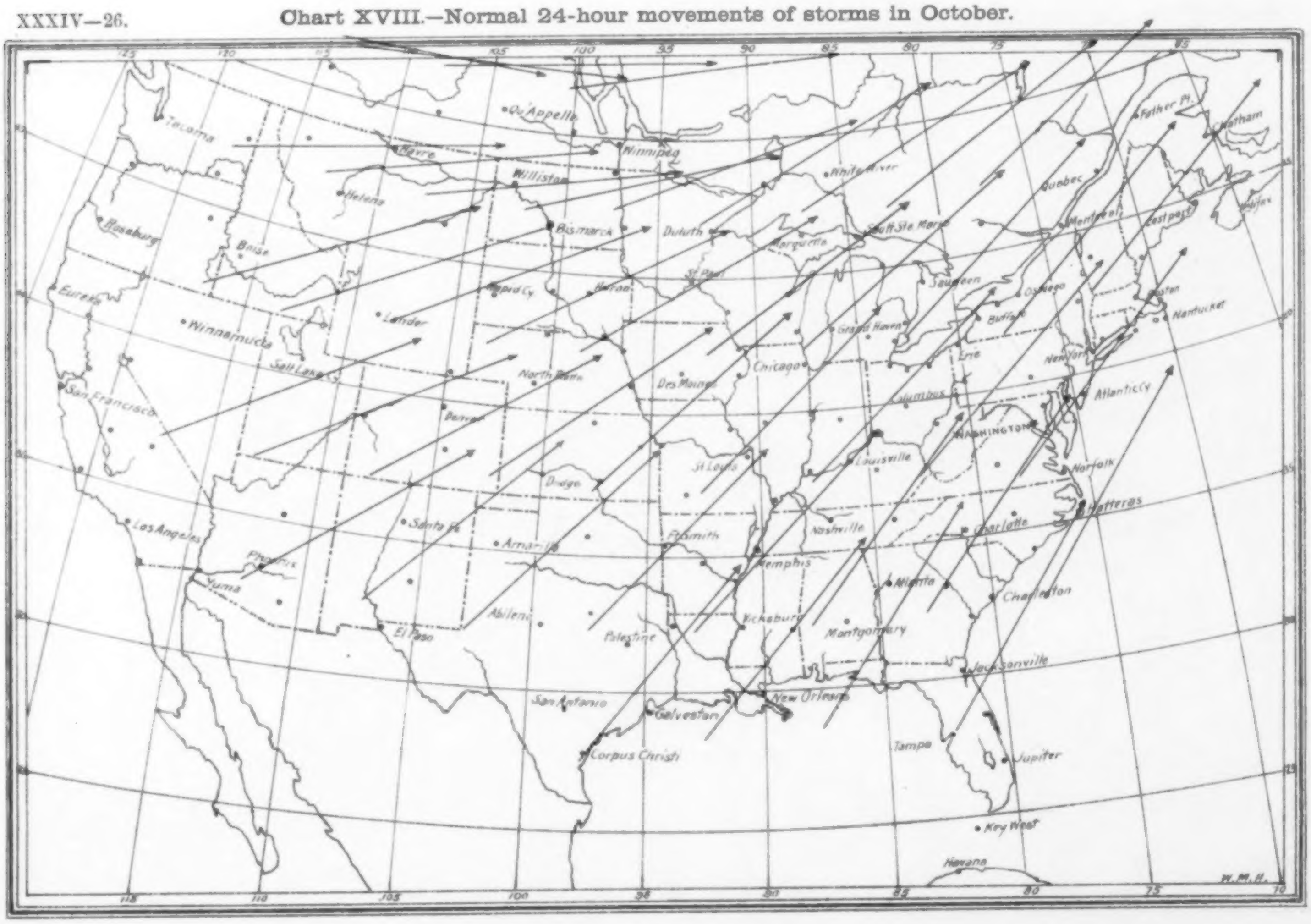
XXXIV—25.

Chart XVII.—Normal 24-hour movements of storms in September.



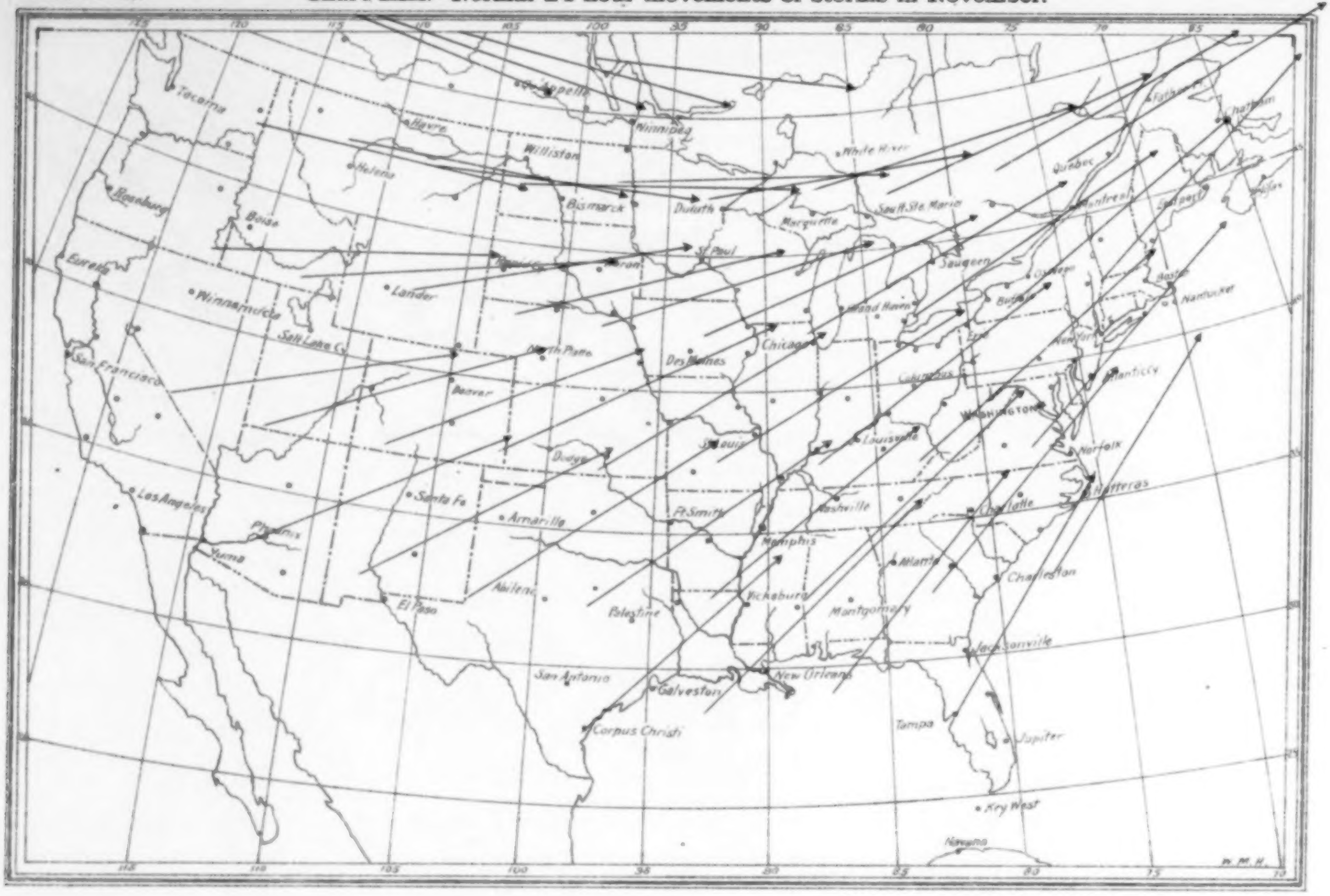
XXXIV—26.

Chart XVIII.—Normal 24-hour movements of storms in October.



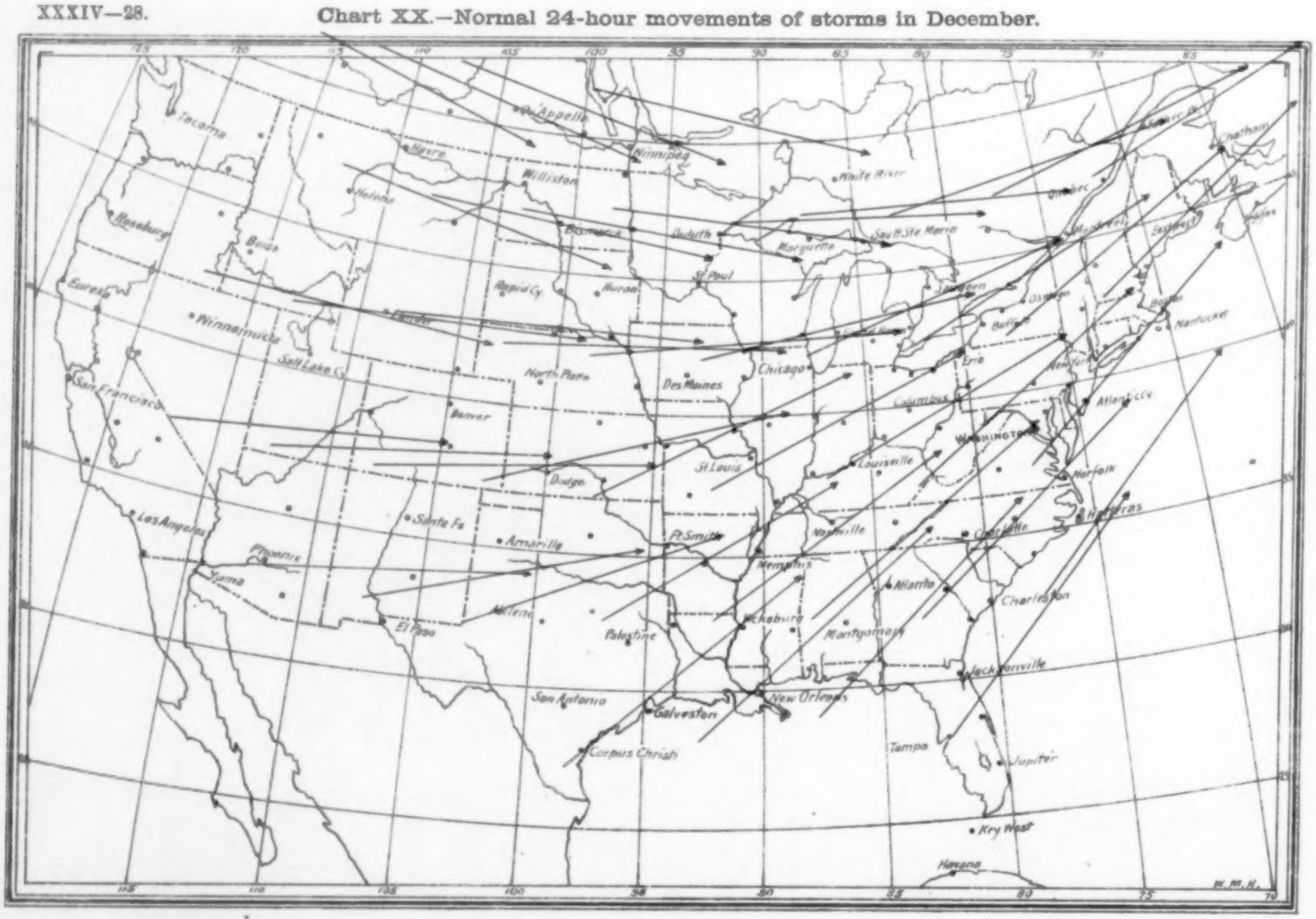
XXXIV—27.

Chart XIX.—Normal 24-hour movements of storms in November.

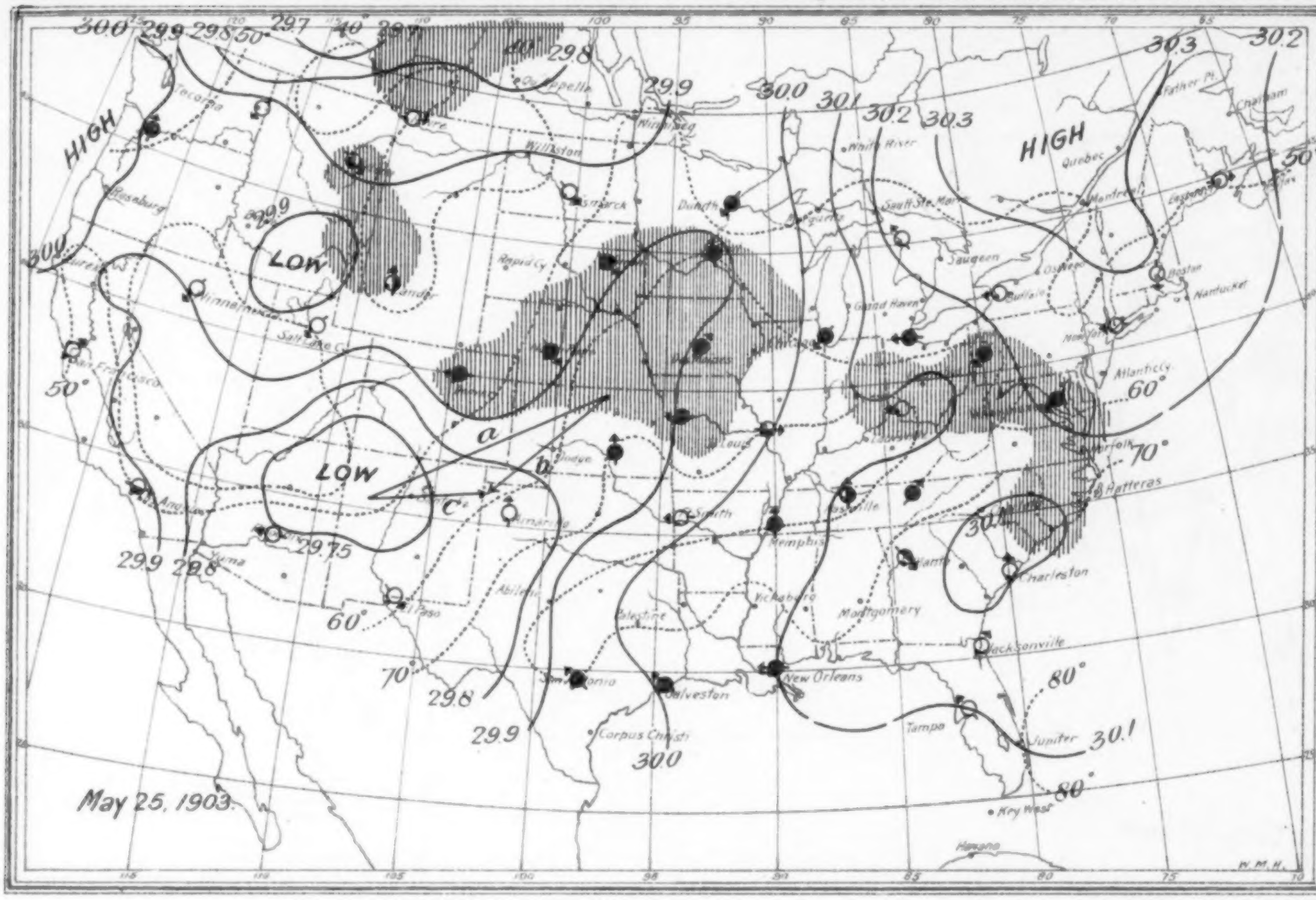


XXXIV—28.

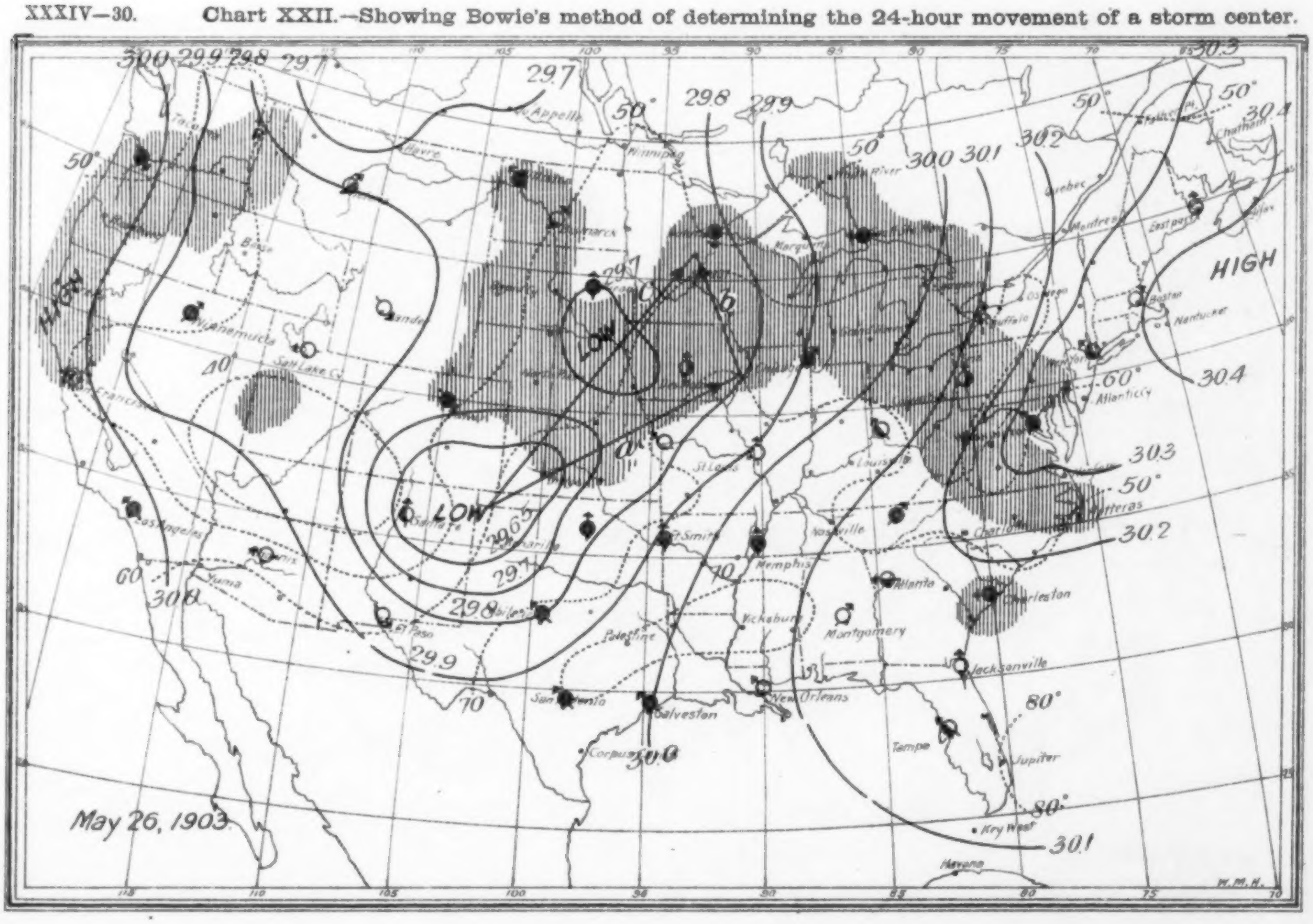
Chart XX.—Normal 24-hour movements of storms in December.



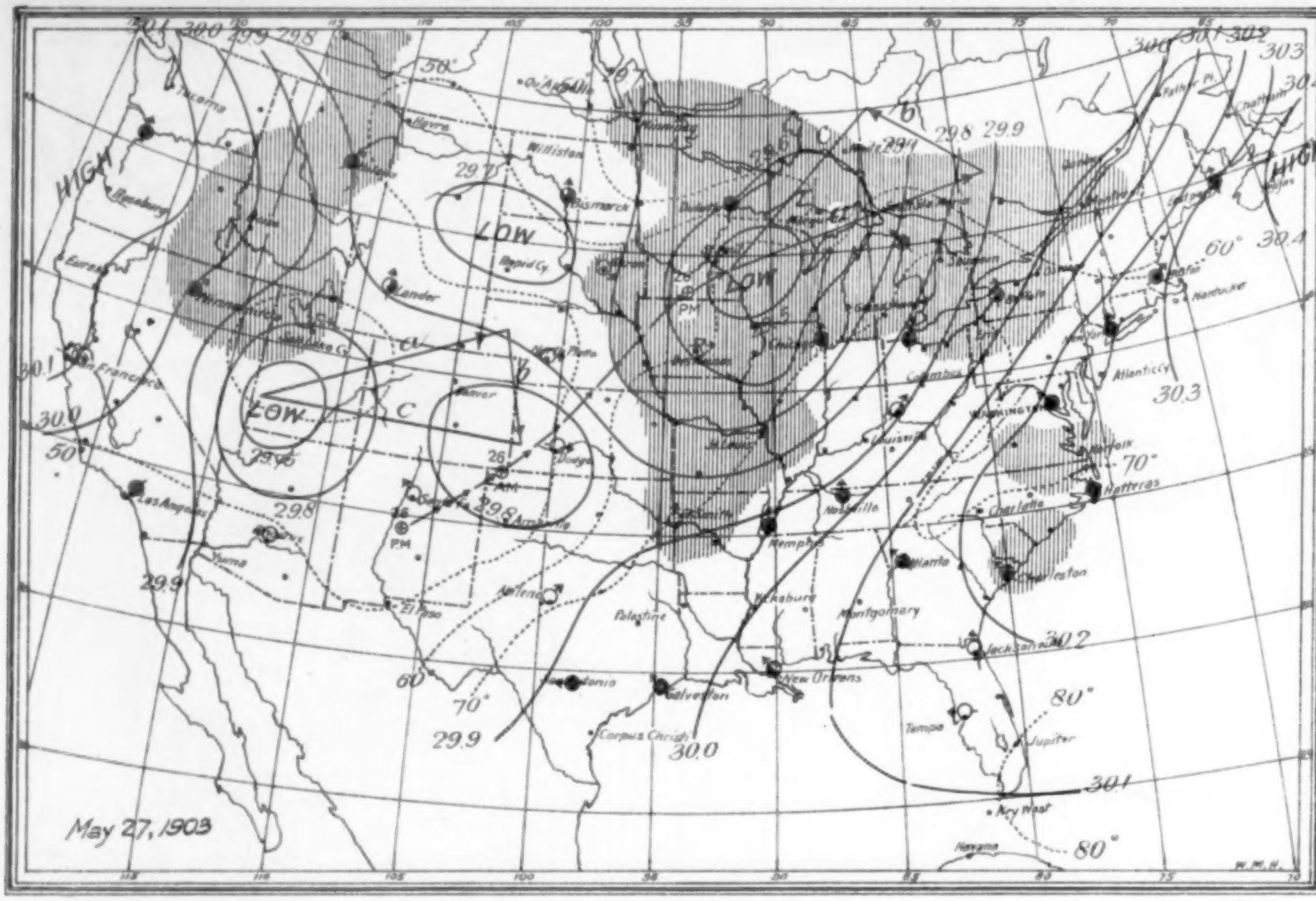
XXXIV—29. Chart XXI.—Showing Bowie's method of determining the 24-hour movement of a storm center.



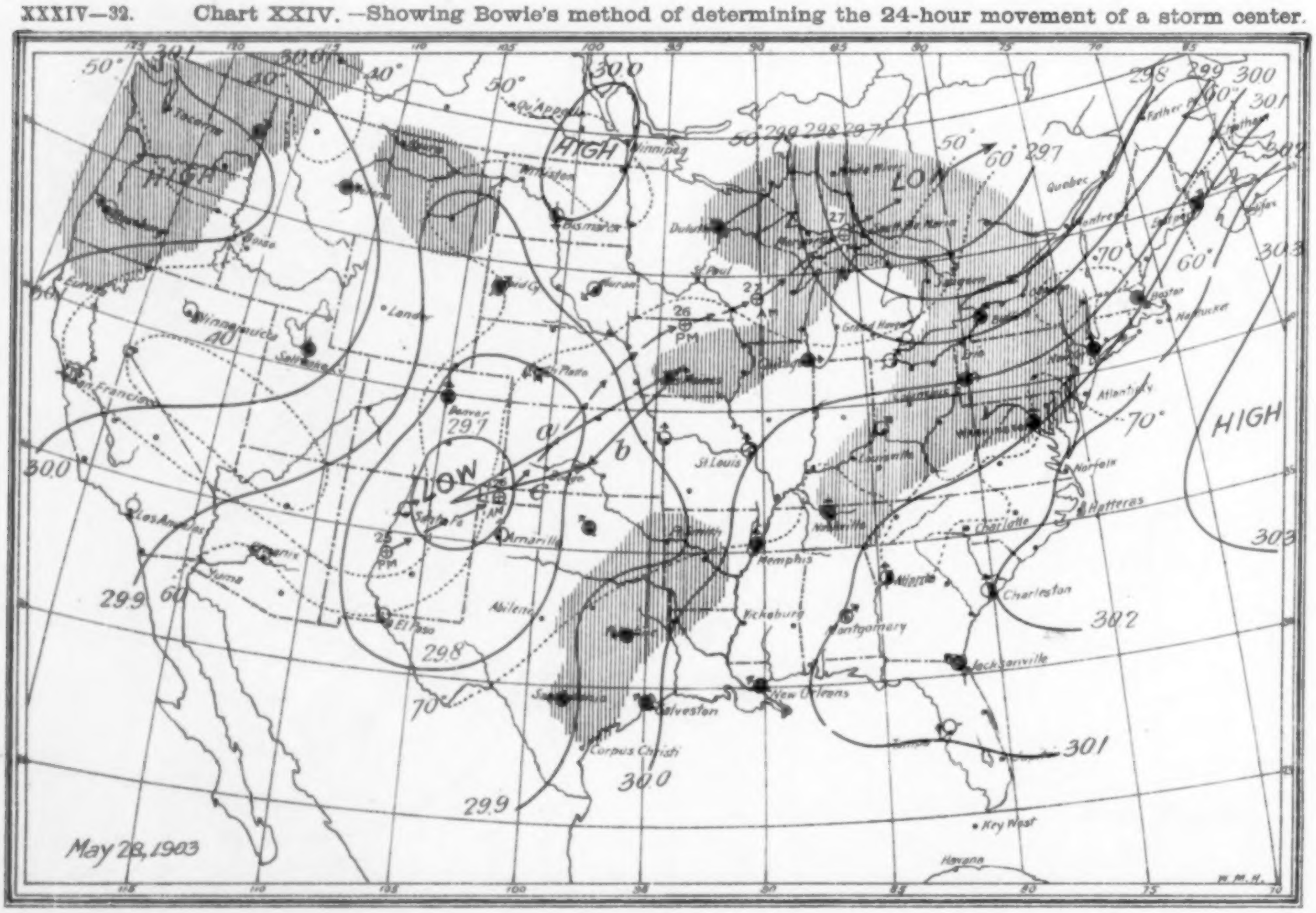
XXXIV—30. Chart XXII.—Showing Bowie's method of determining the 24-hour movement of a storm center.



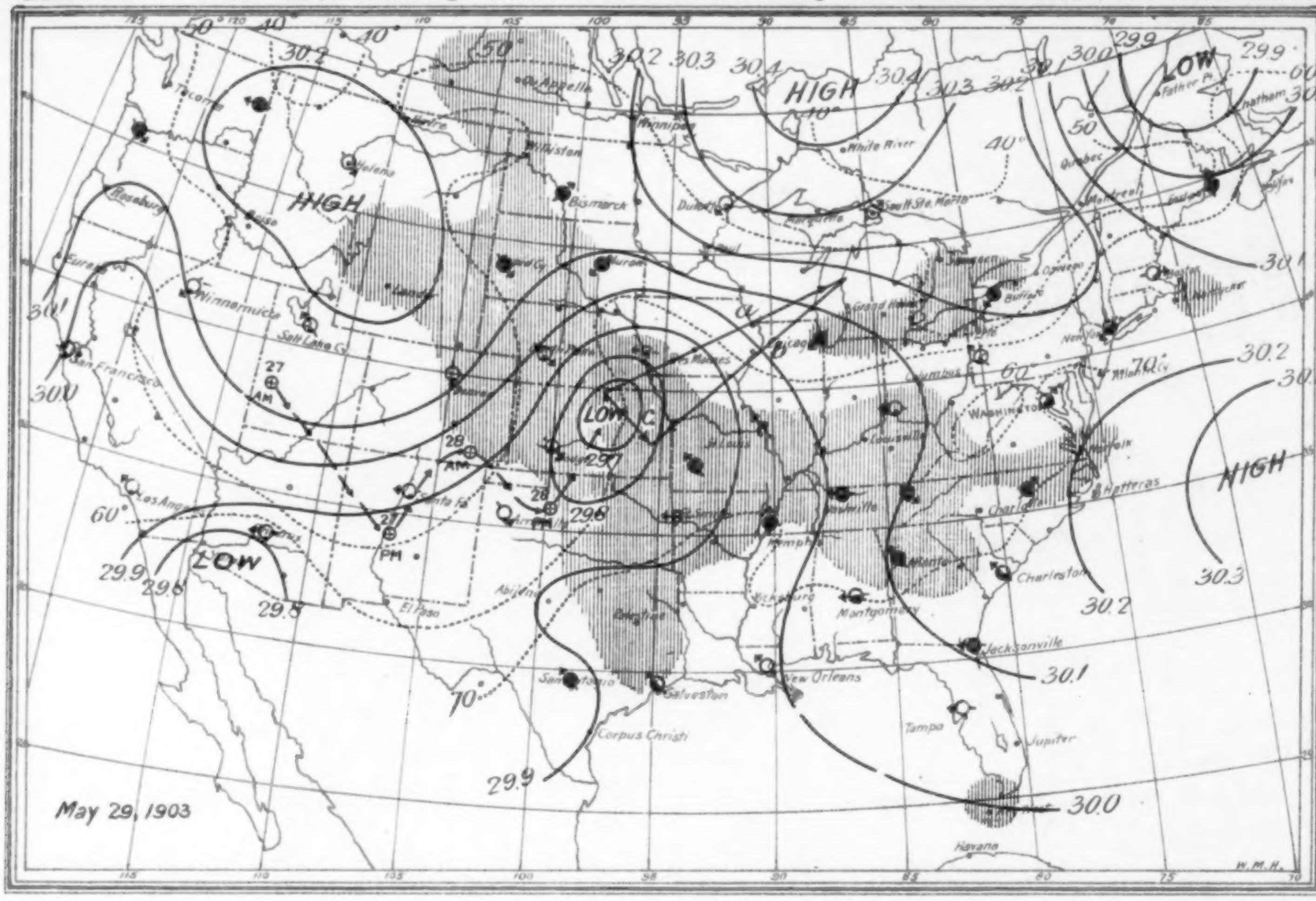
XXXIV—31. Chart XXIII.—Showing Bowie's method of determining the 24-hour movement of a storm center.



XXXIV—32. Chart XXIV.—Showing Bowie's method of determining the 24-hour movement of a storm center.



XXXIV—33. Chart XXV. —Showing Bowie's method of determining the 24-hour movement of a storm center.



XXXIV—34. Chart XXVI.—Showing Bowie's method of determining the 24-hour movement of a storm center.

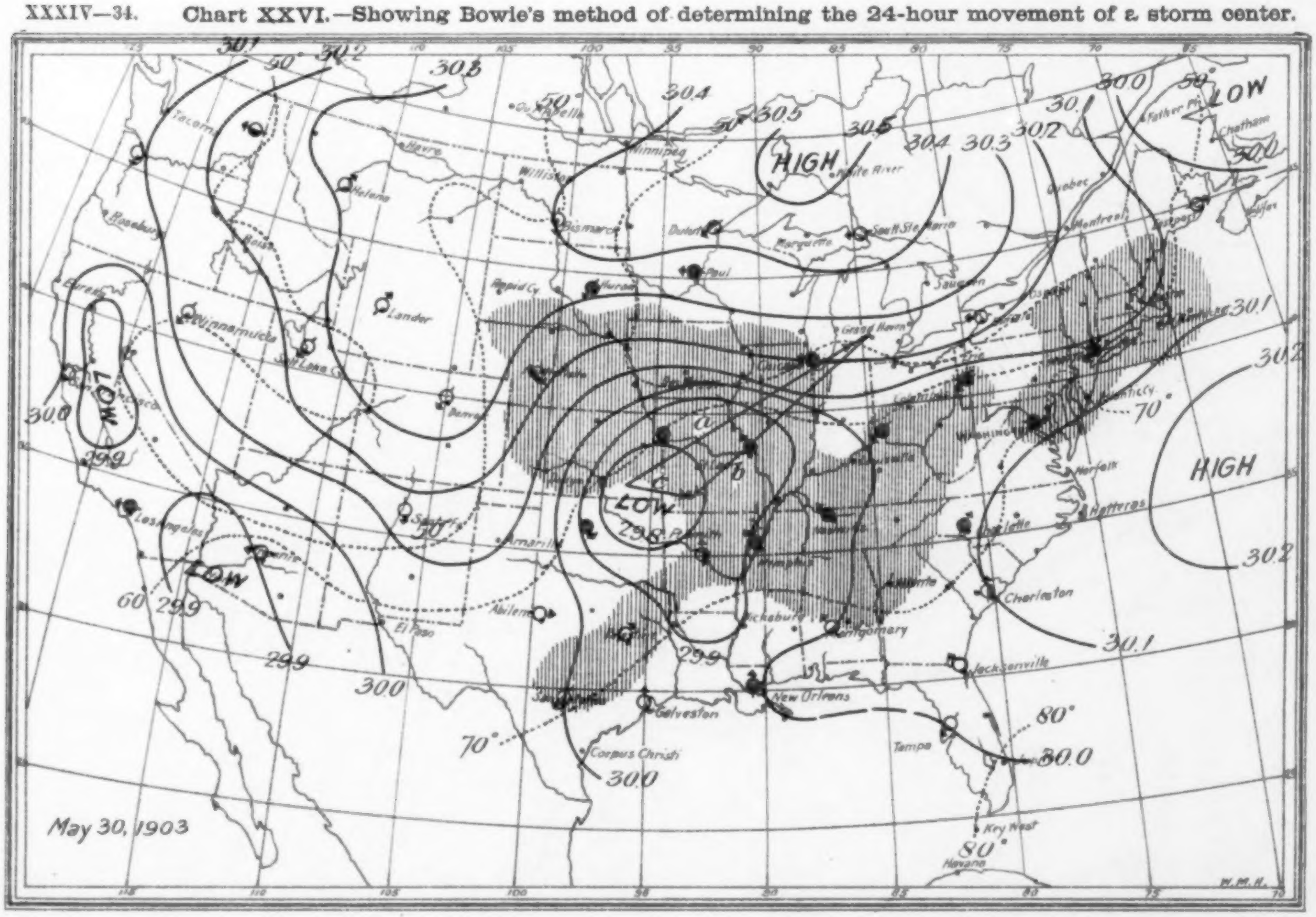


 Chart XXVII.—Showing Bowie's method of determining the 24-hour movement of a storm center.

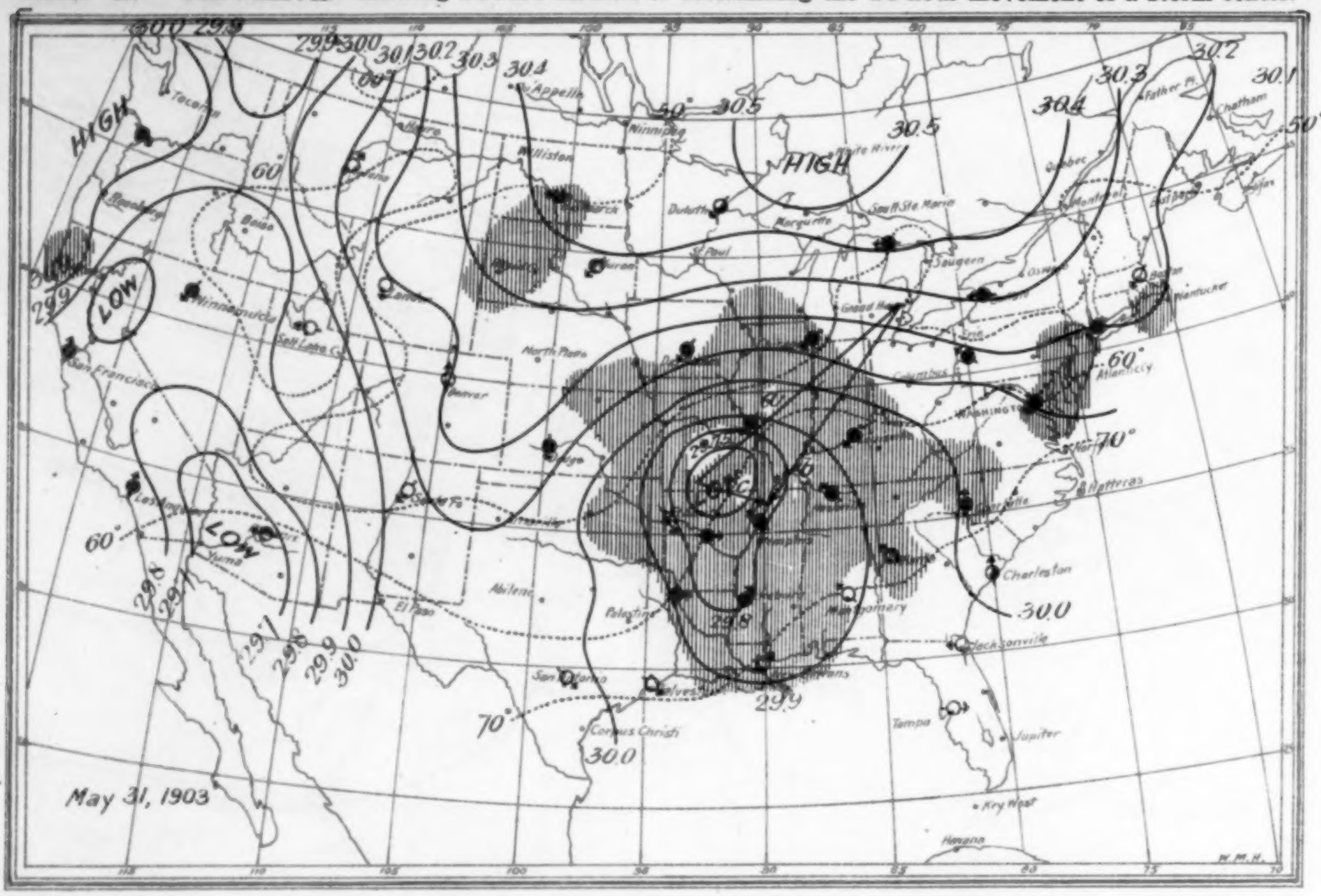
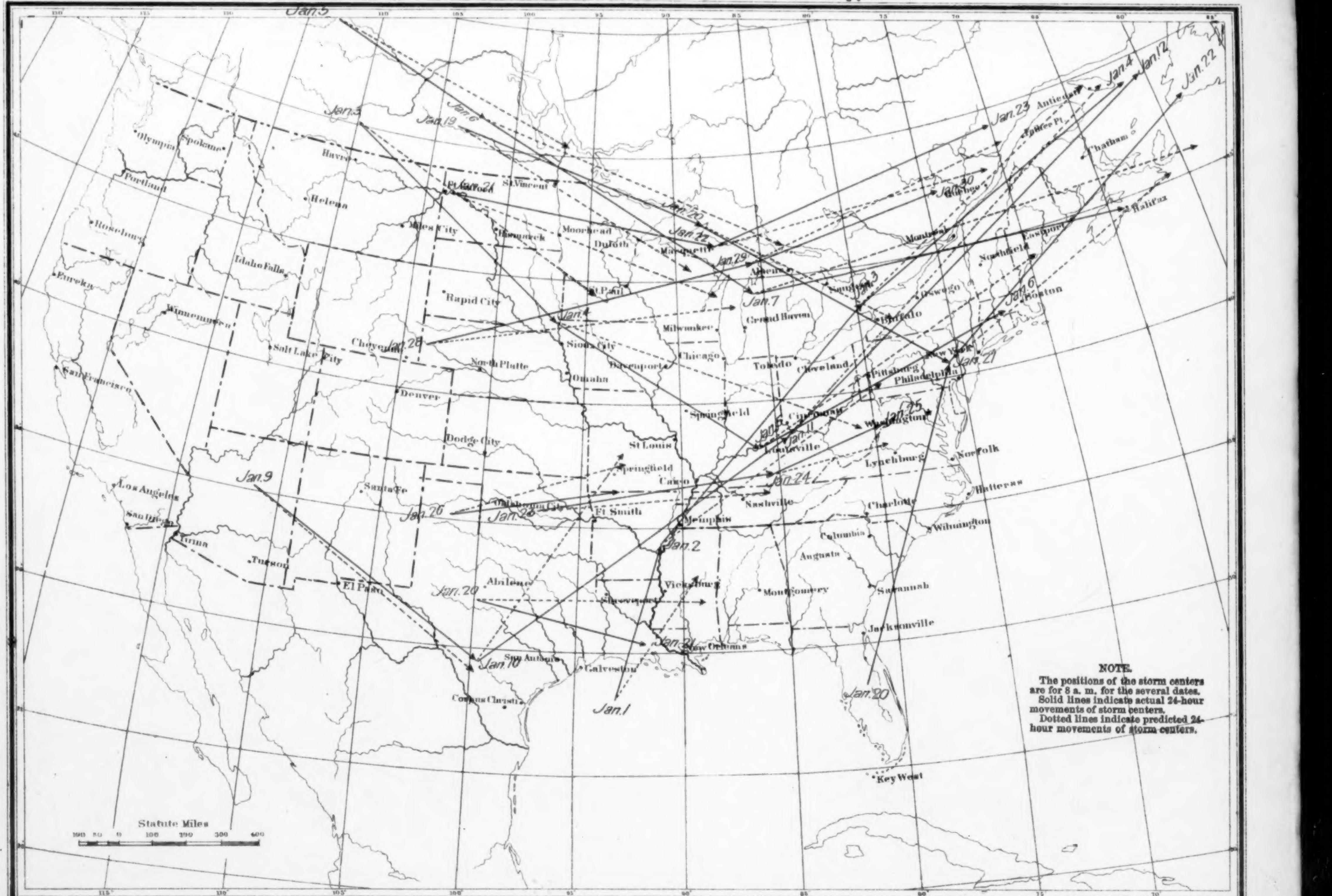


Chart XXVIII.—Actual and predicted storm paths for January, 1903.

XXXIV—36.

Chart XXVIII.—Actual and predicted storm paths for January, 1903.



NOTE.

The positions of the storm centers are for 8 a. m. for the several dates.
Solid lines indicate actual 24-hour movements of storm centers.
Dotted lines indicate predicted 24-hour movements of storm centers.

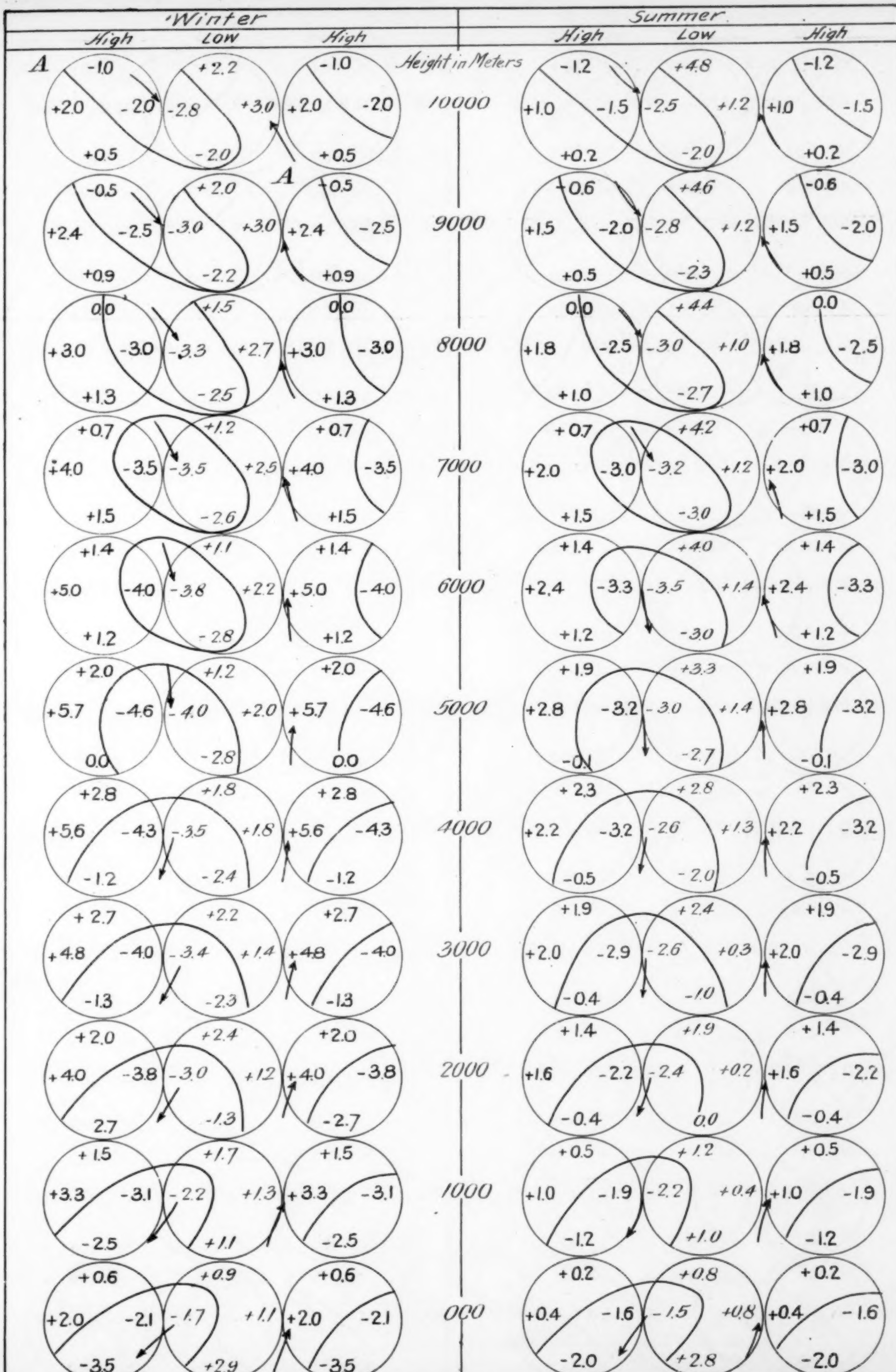


FIG. 5.—Mean Temperature Variations, ΔT, in American and European Cyclones and Anticyclones.

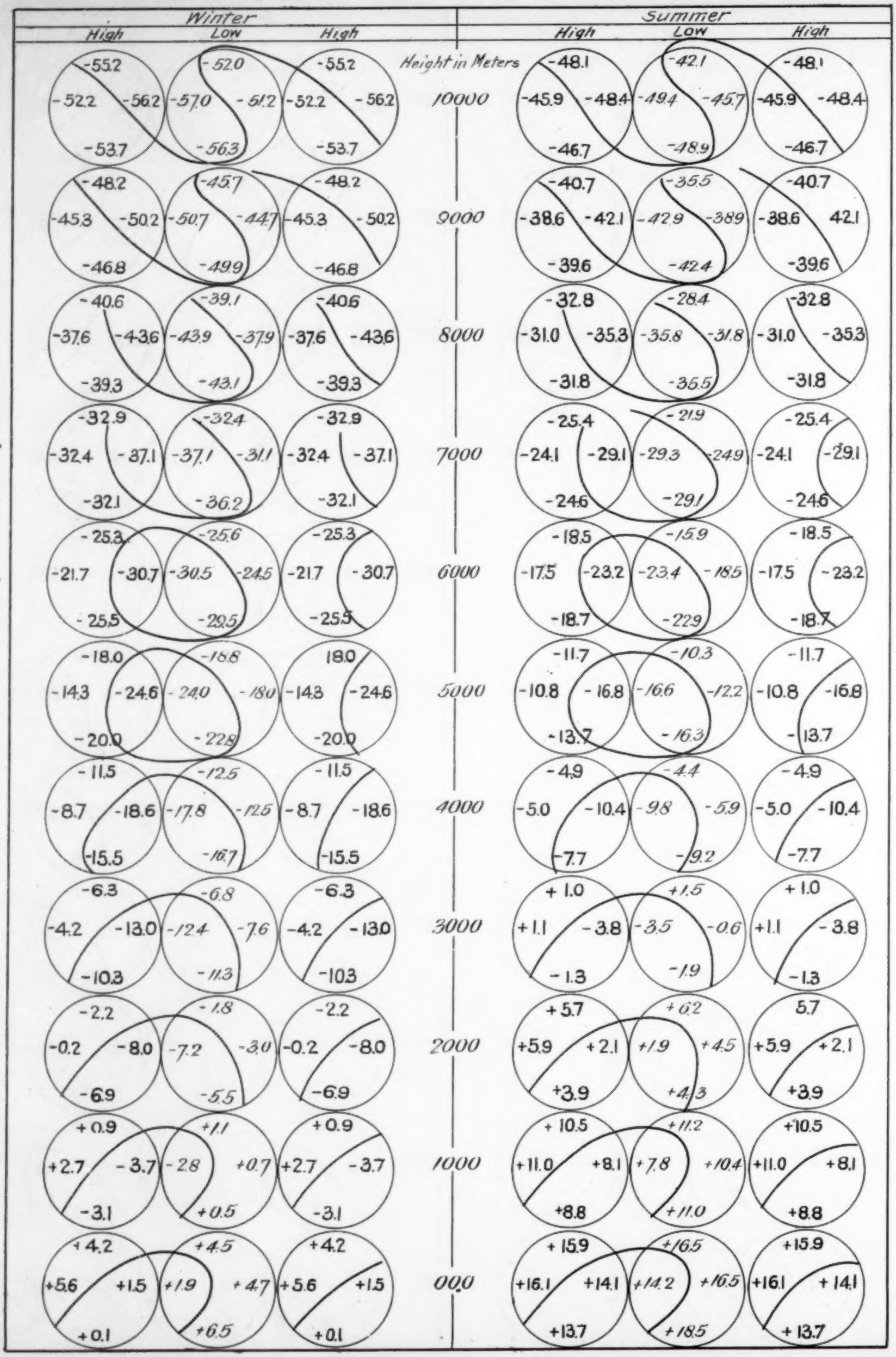


FIG. 6.—Mean Temperature Distribution, T, in Cyclones and Anticyclones.

XXXIV—39.

Fig. 7.—Adopted Temperature Distribution, Derived from the Mean American and European Observations.

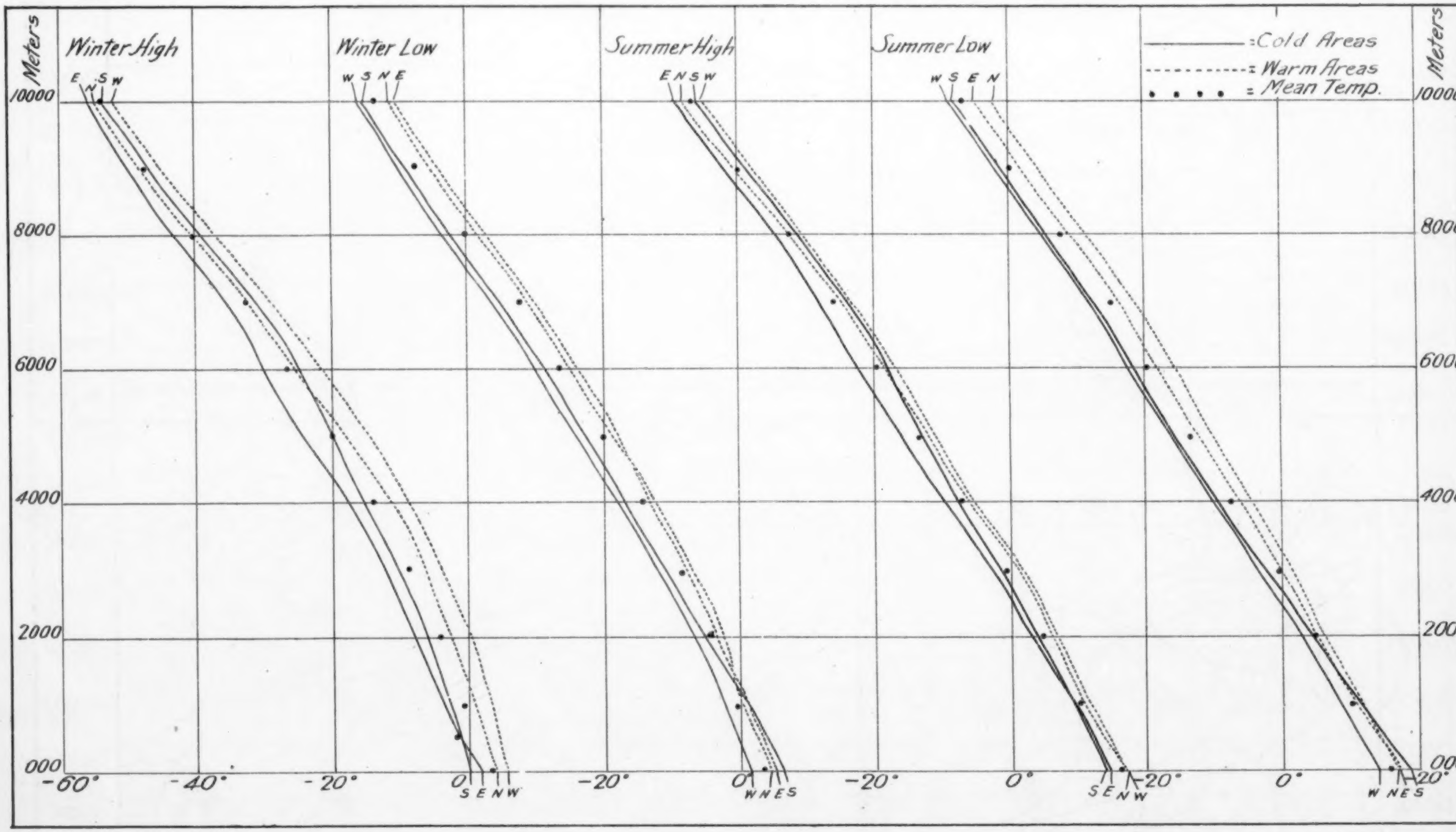


Fig. 8.—Temperature-fall per 1000 Meters in Each Quadrant. (Latitude +40° to +60°.)

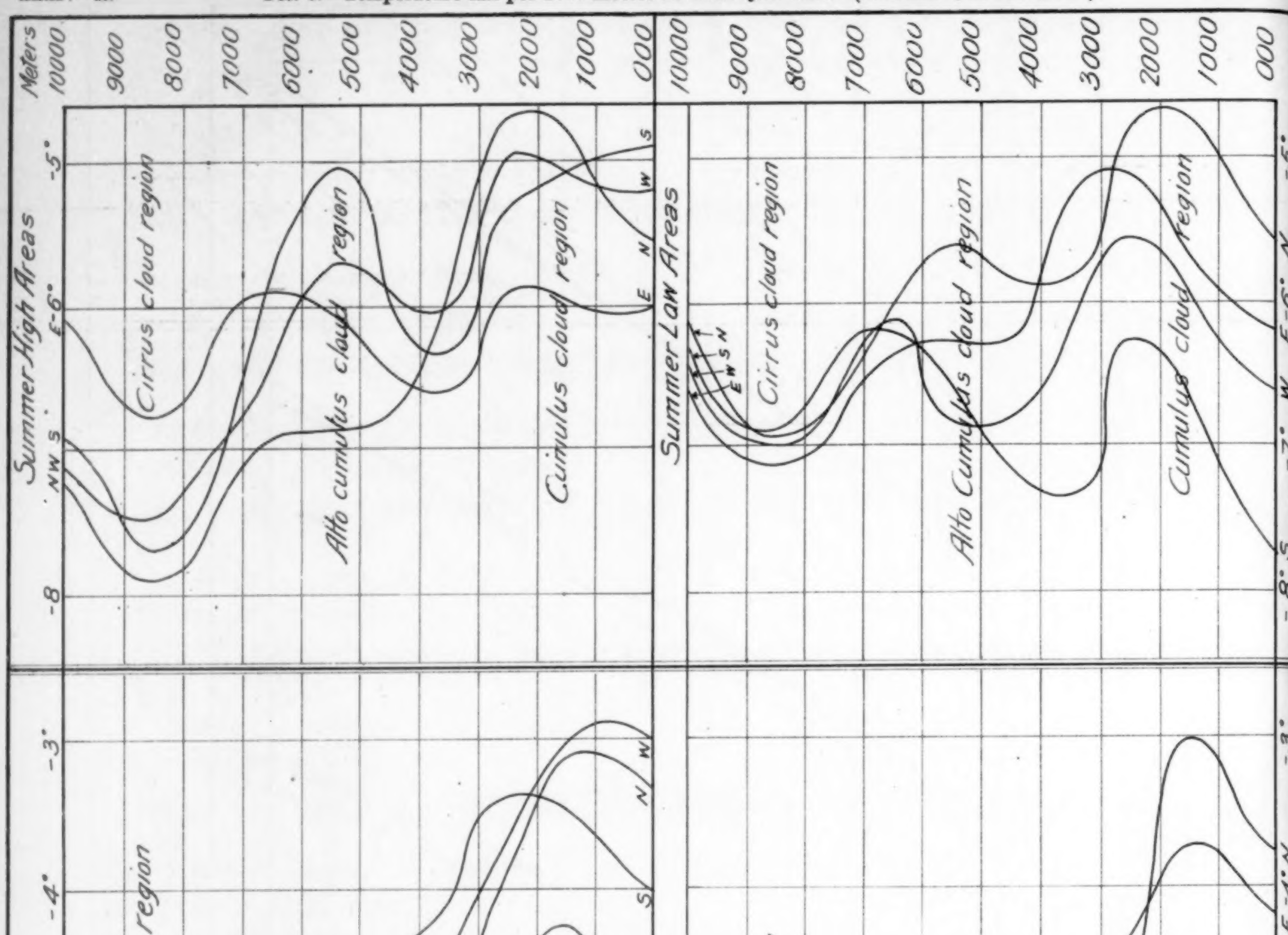


FIG. 9.—Typical Distribution of the Velocity, Temperature, and Pressure in Cyclones and Anticyclones.

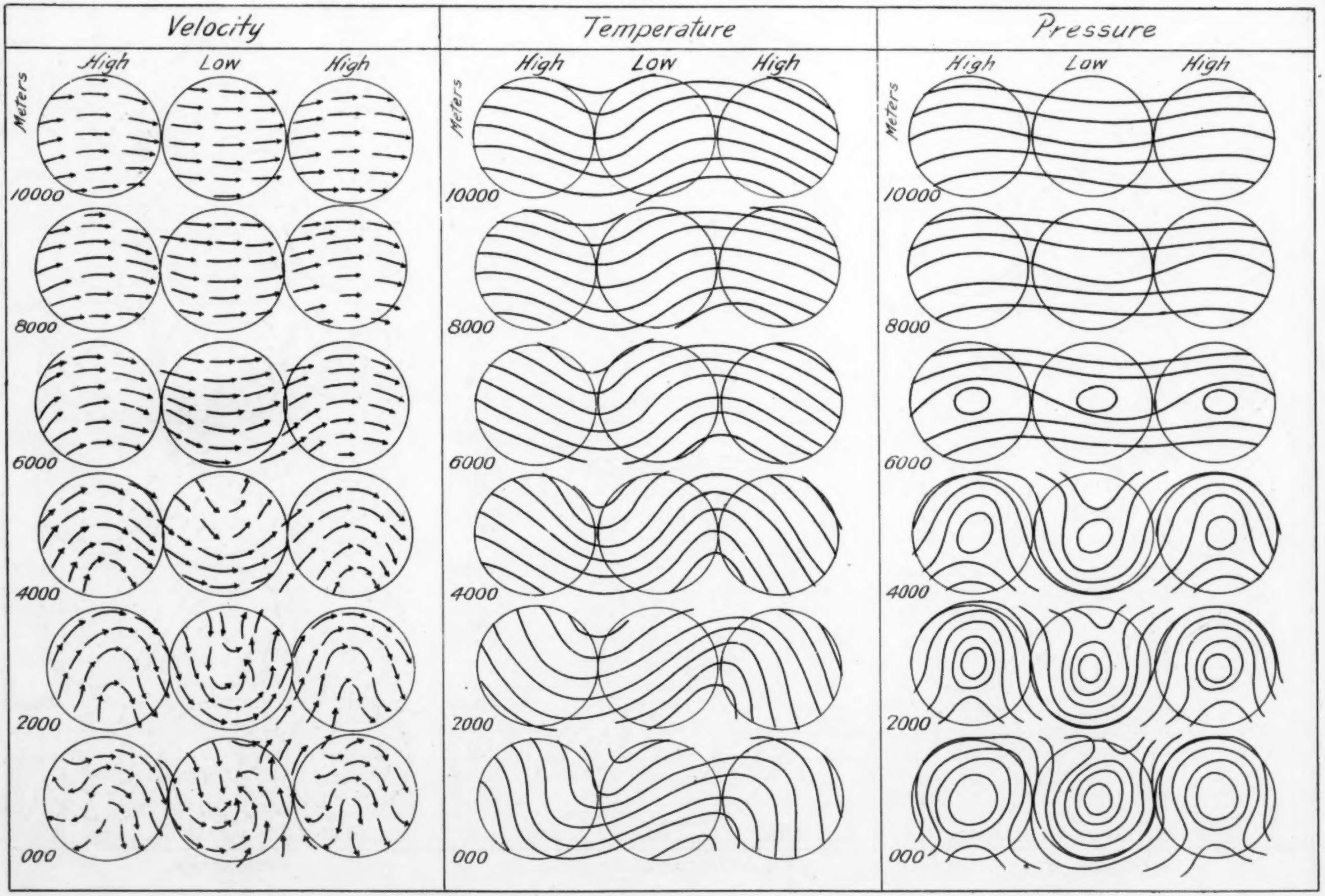


Fig. 10.—Typical Distributions of the Cyclonic and Anticyclonic Components of Velocity, Temperature, and Pressure.

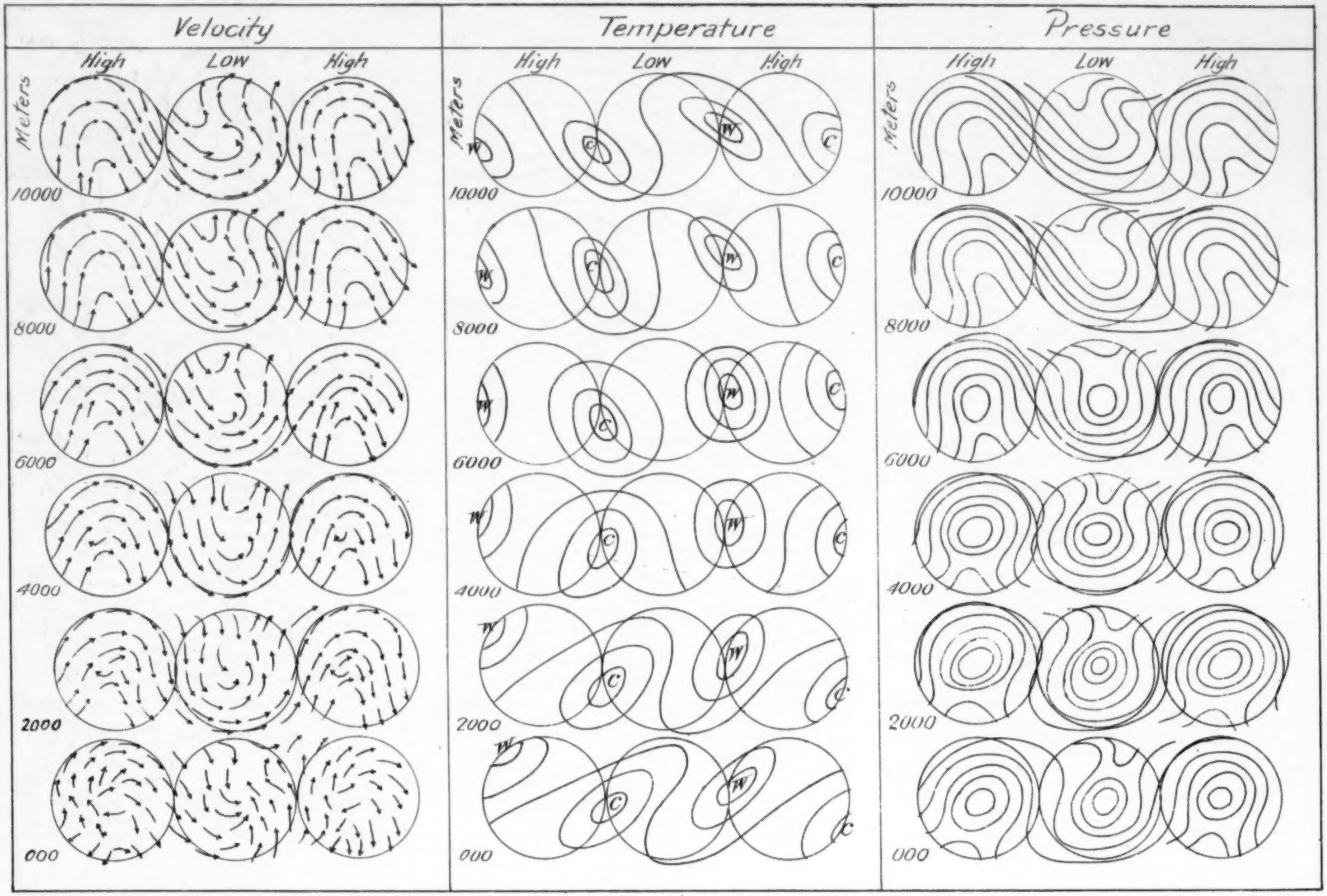


Chart I. Hydrographs for Seven Principal Rivers of the United States, March, 1906.

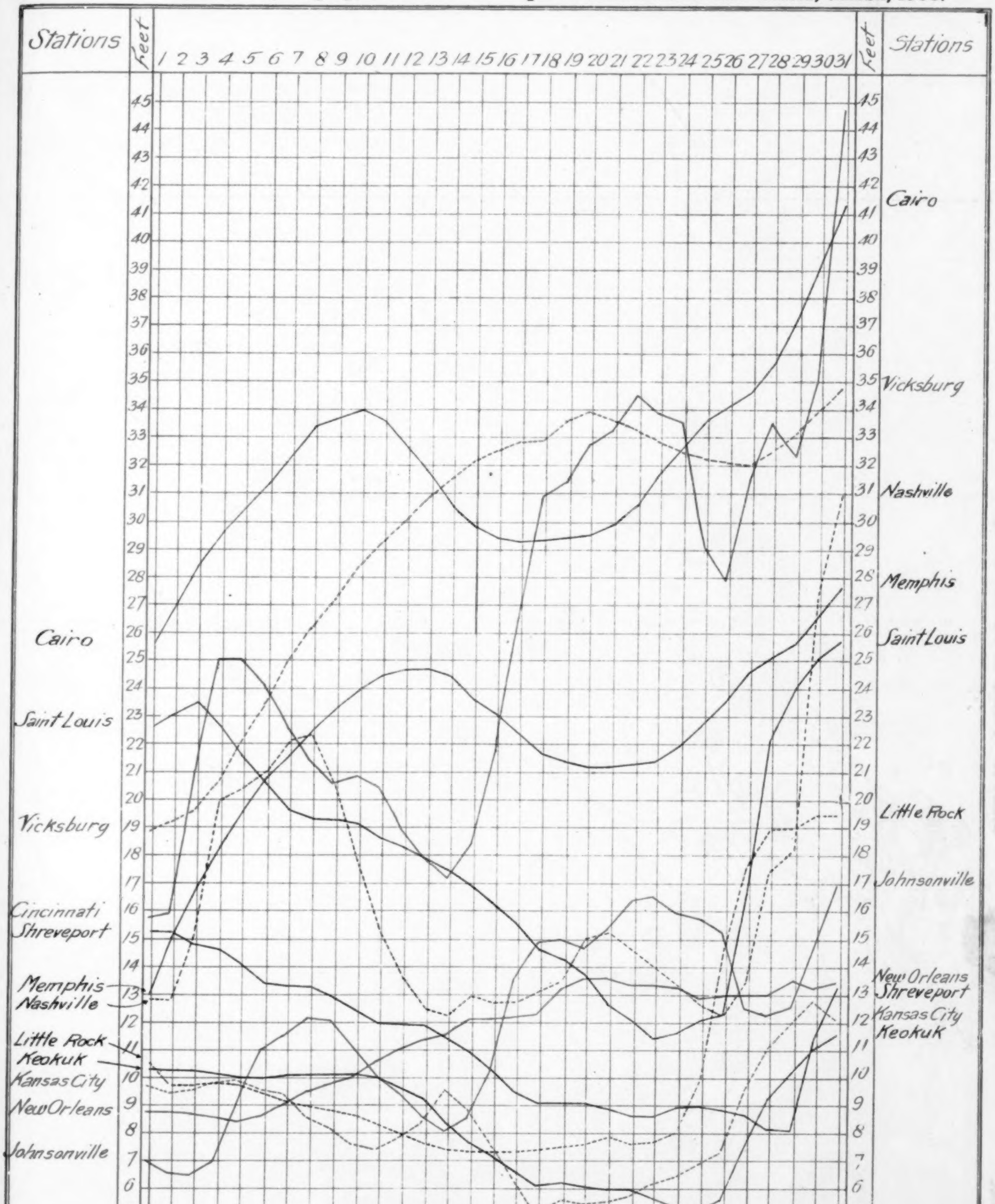


Chart II. Tracks of Centers of High Areas, March, 1906.

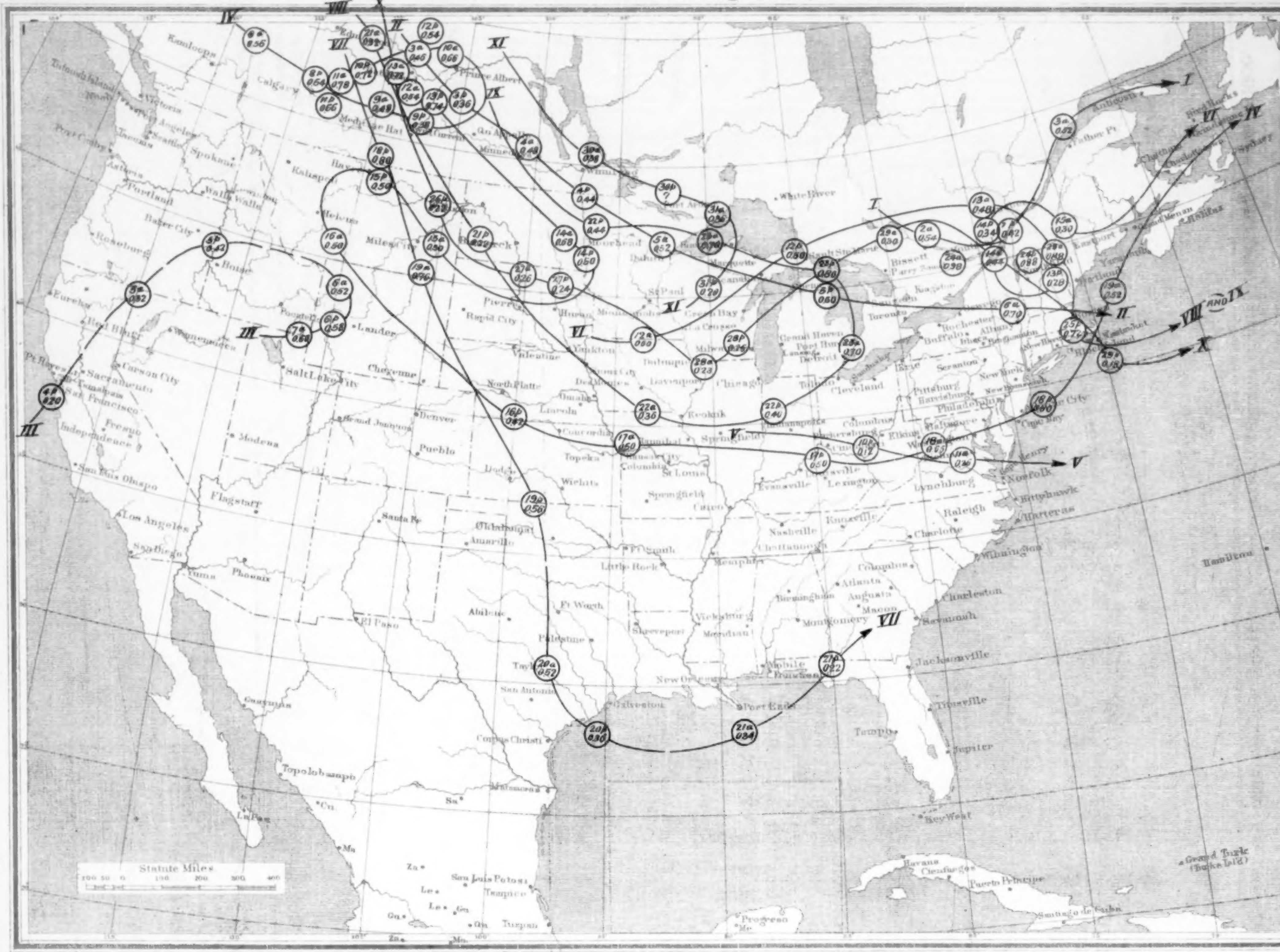


Chart III. Tracks of Centers of Low Areas, March, 1906.

Chart III. Tracks of Centers of Low Areas, March, 1906.

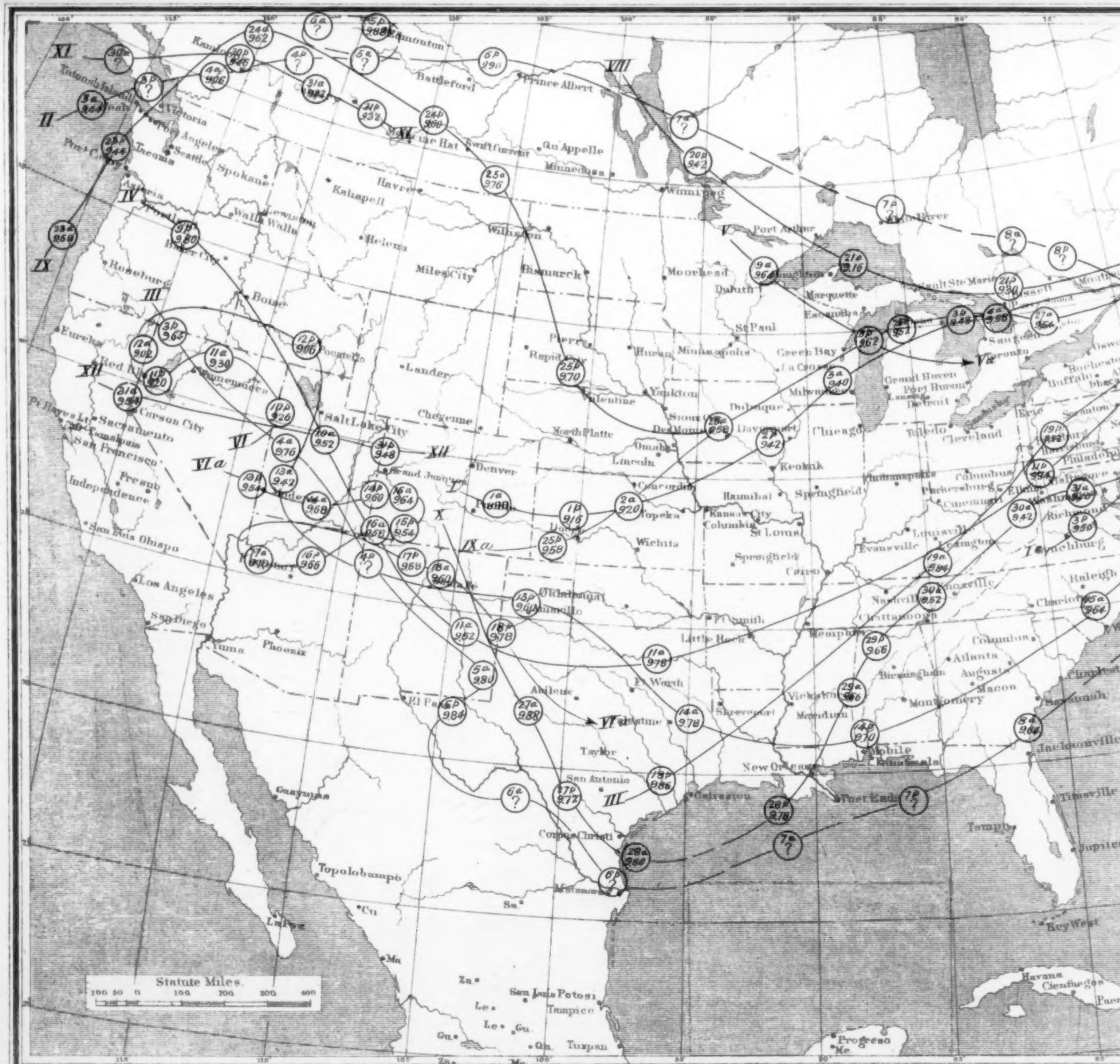


Chart IV. Total Precipitation, March, 1906.

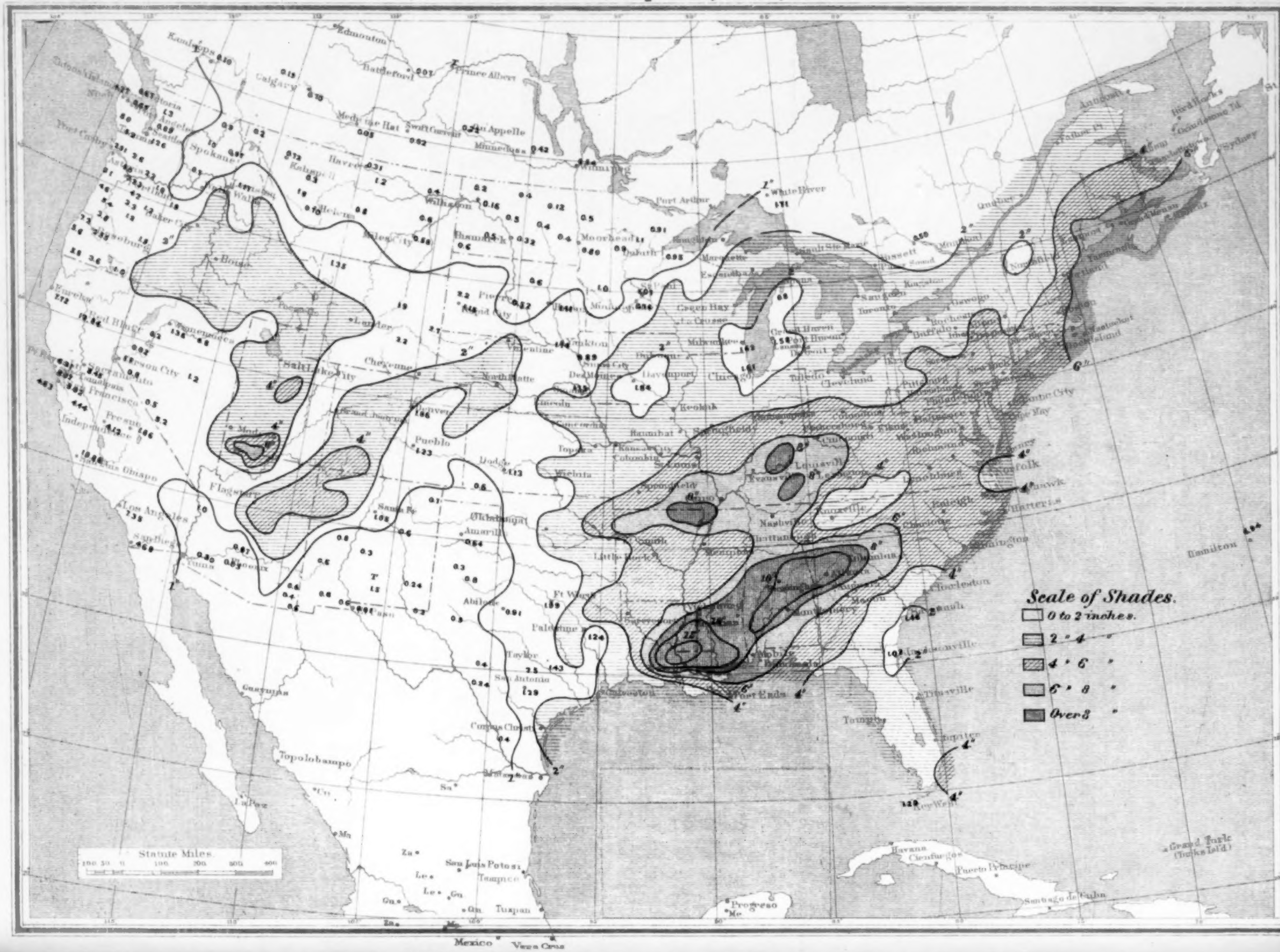


Chart V. Percentage of Clear Sky between Sunrise and Sunset, March, 1906.

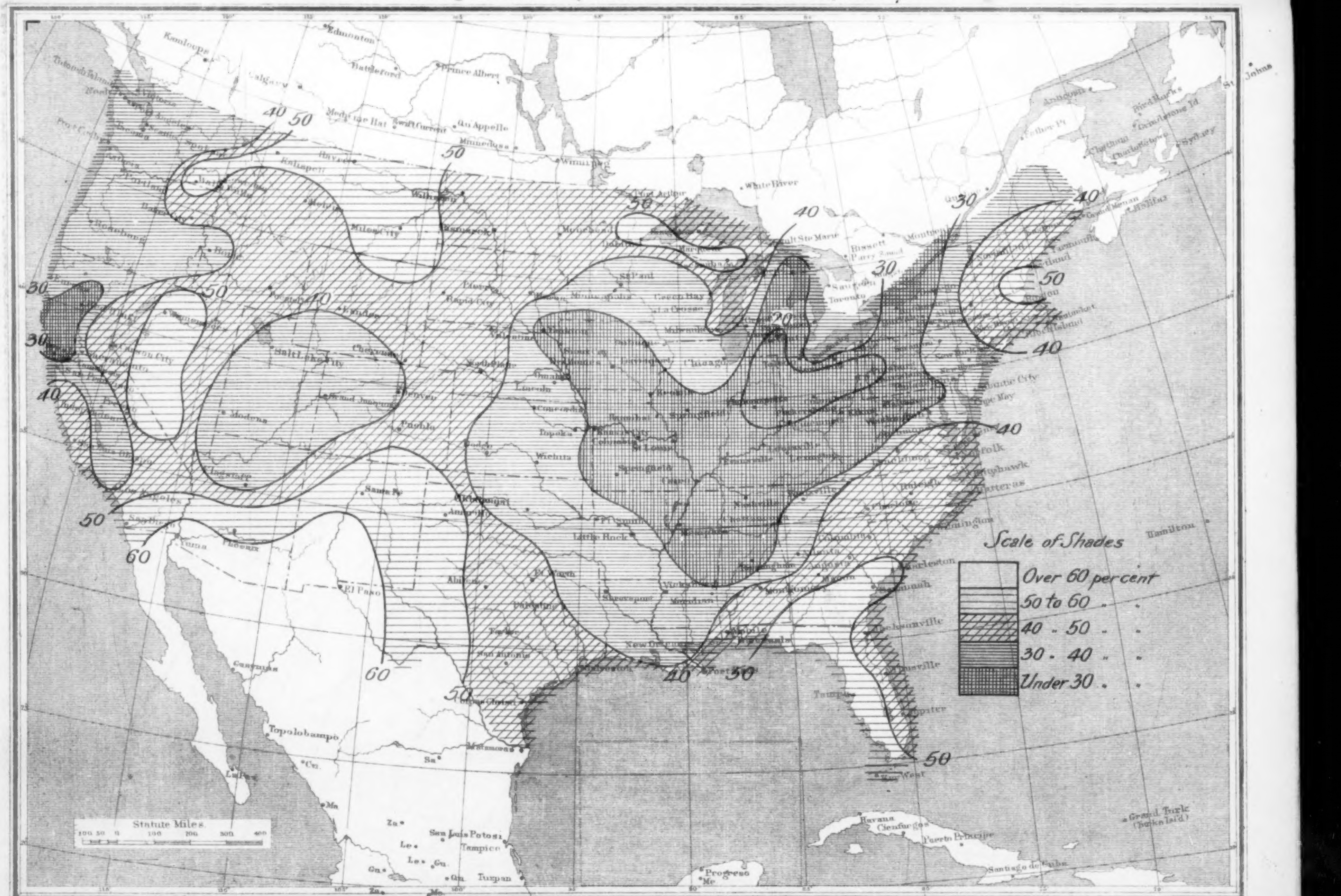


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, March, 1906.

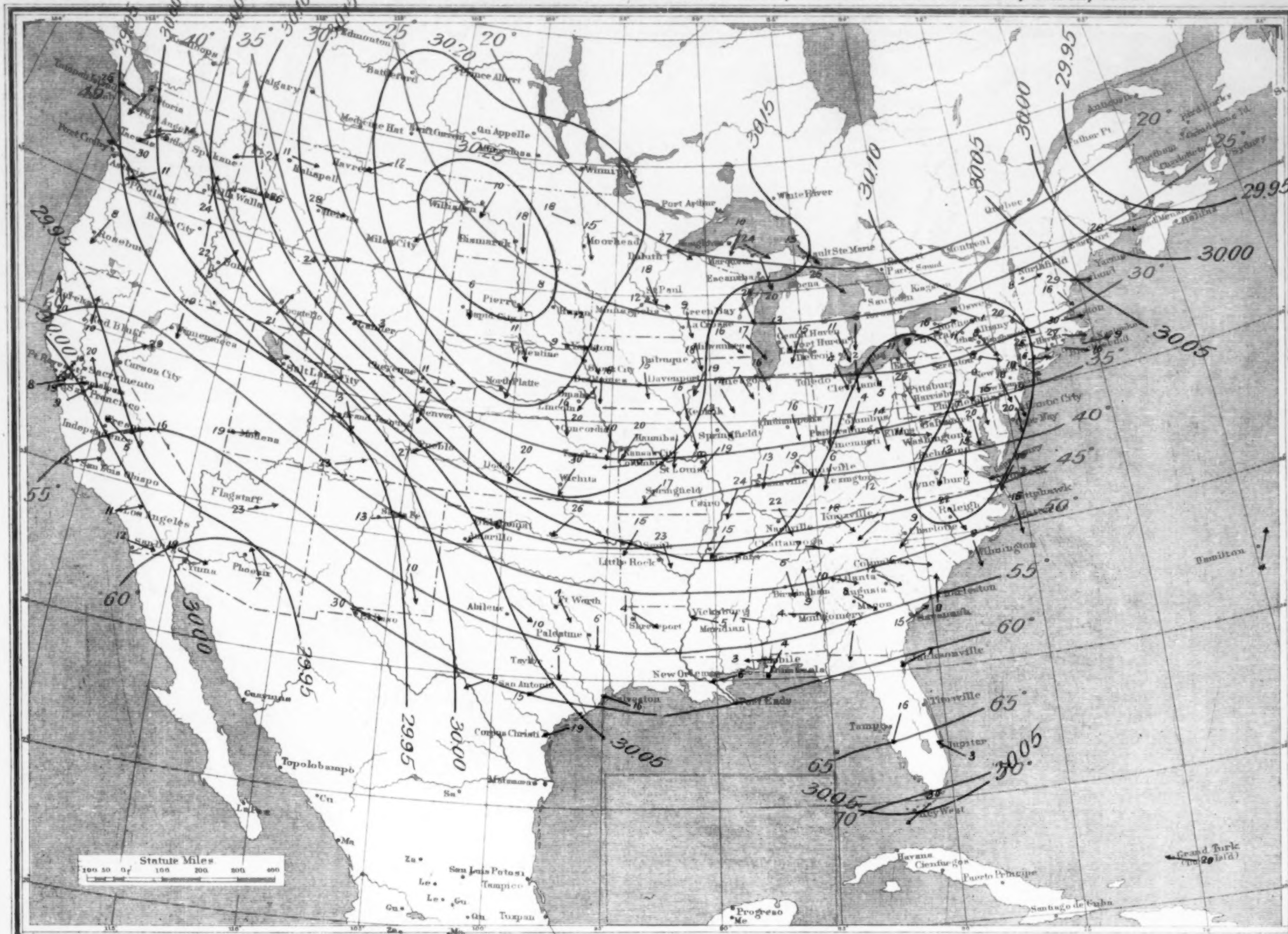


Chart VII. Total Snowfall for March, 1906.

Chart VII. Total Snowfall for March, 1906.

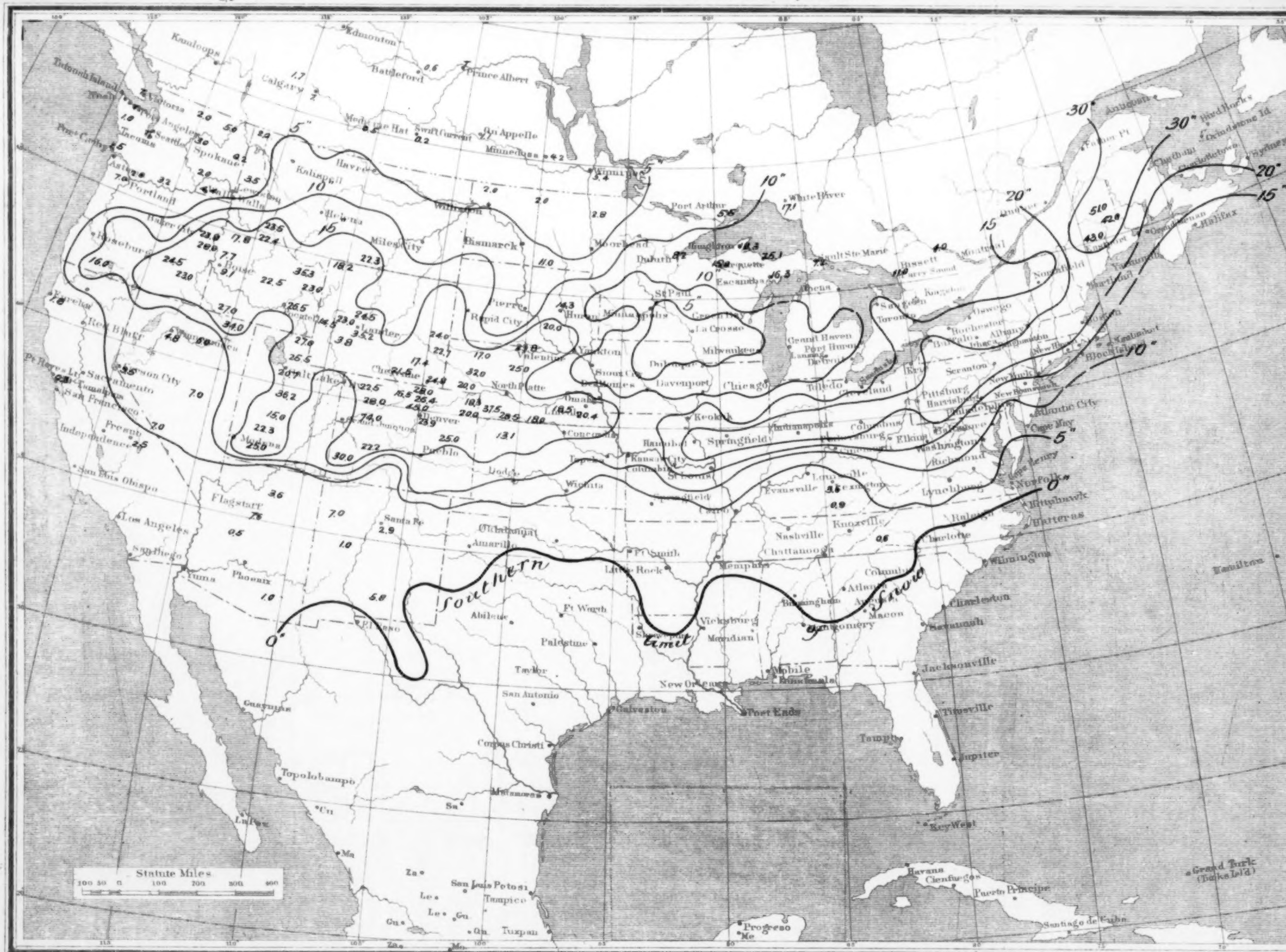


Chart I. Hydrographs for Seven Principal Rivers of the United States, April, 1906.

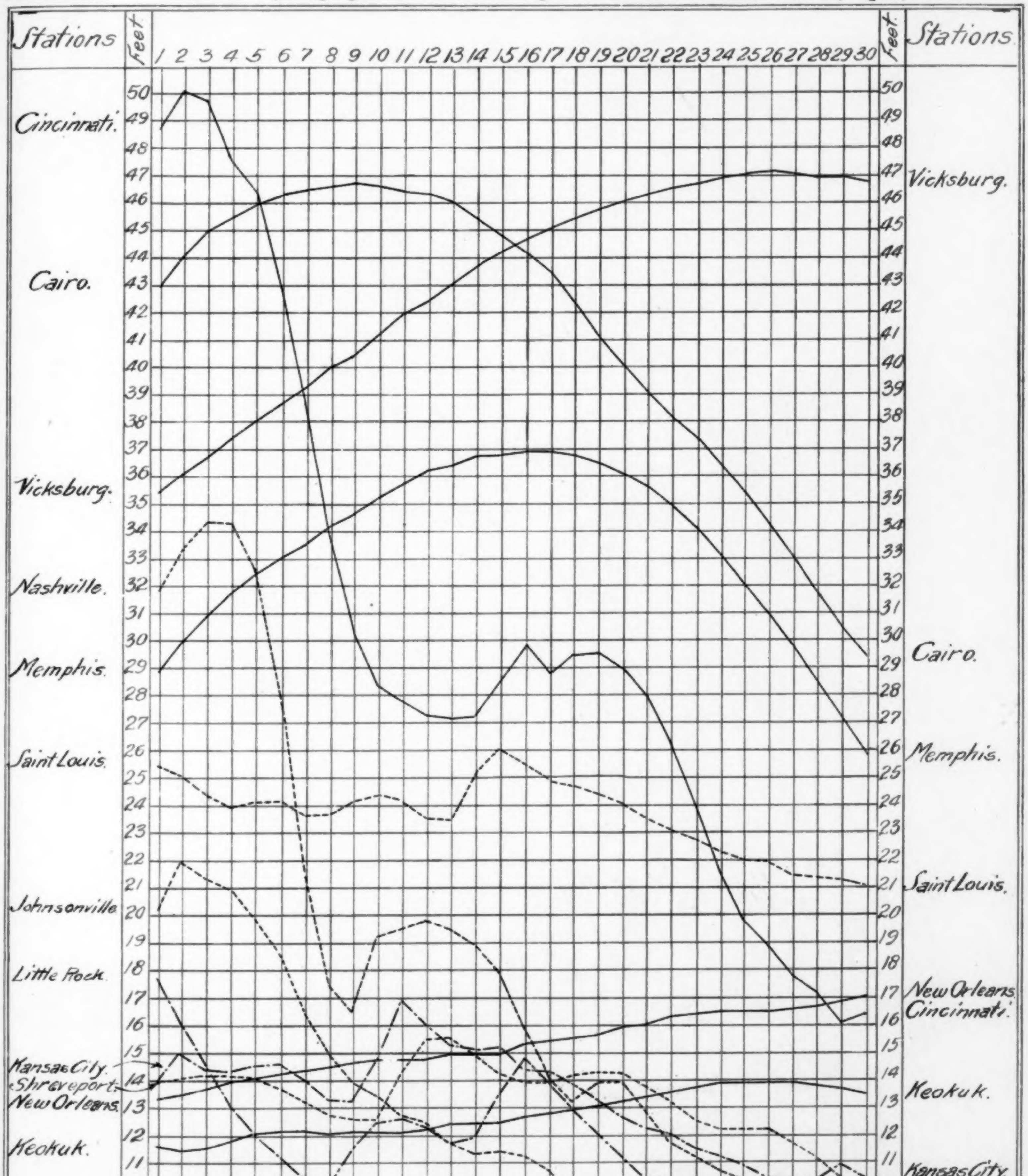
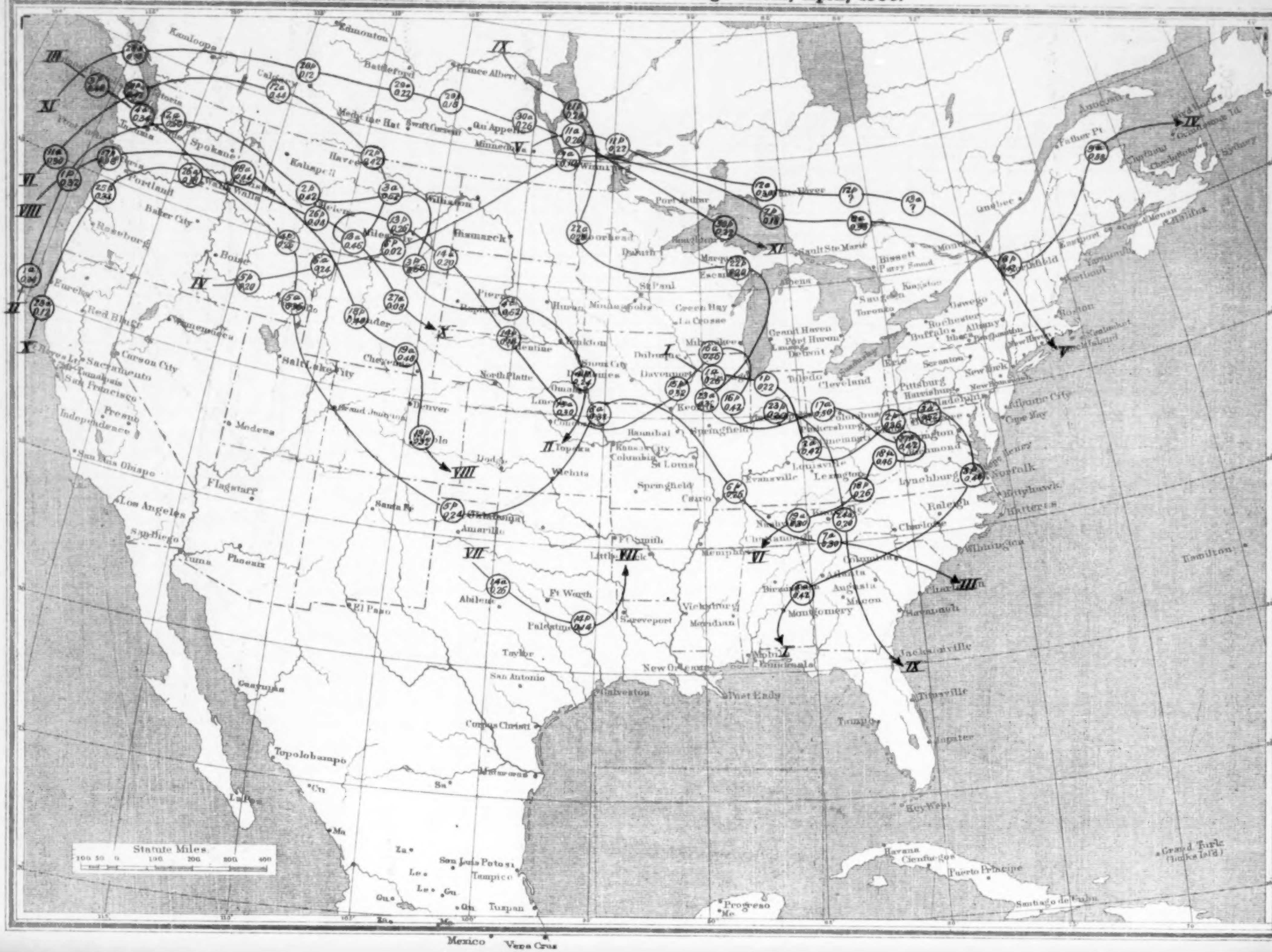


Chart II. Tracks of Centers of High Areas, April, 1906.



• Barkerville

Chart III. Tracks of Centers of Low Areas, April, 1906.

Chart III. Tracks of Centers of Low Areas, April, 1906.

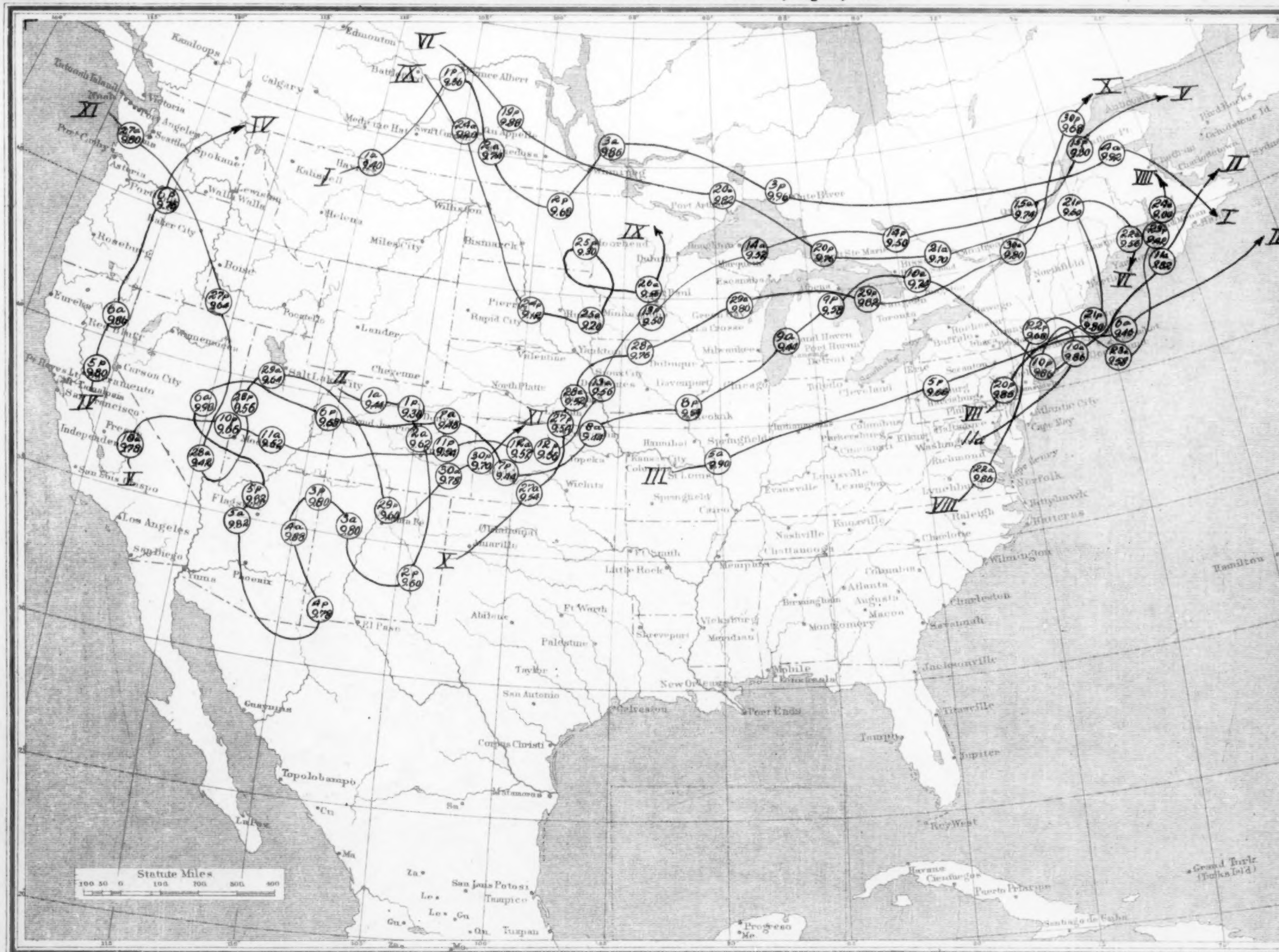


Chart IV. Total Precipitation, April, 1906.

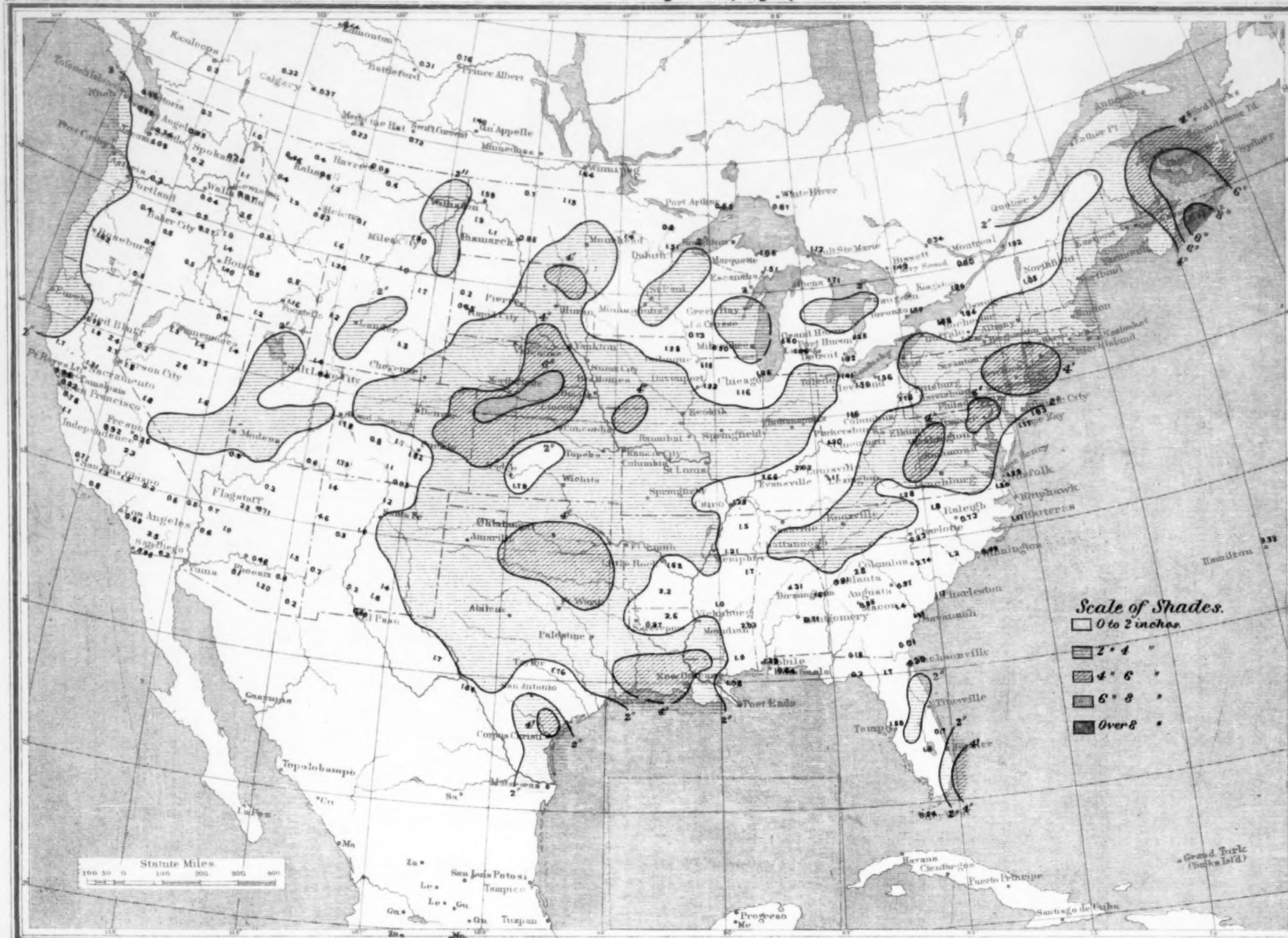


Chart V. Percentage of Clear Sky between Sunrise and Sunset, April, 1906.

Chart V. Percentage of Clear Sky between Sunrise and Sunset, April, 1906.

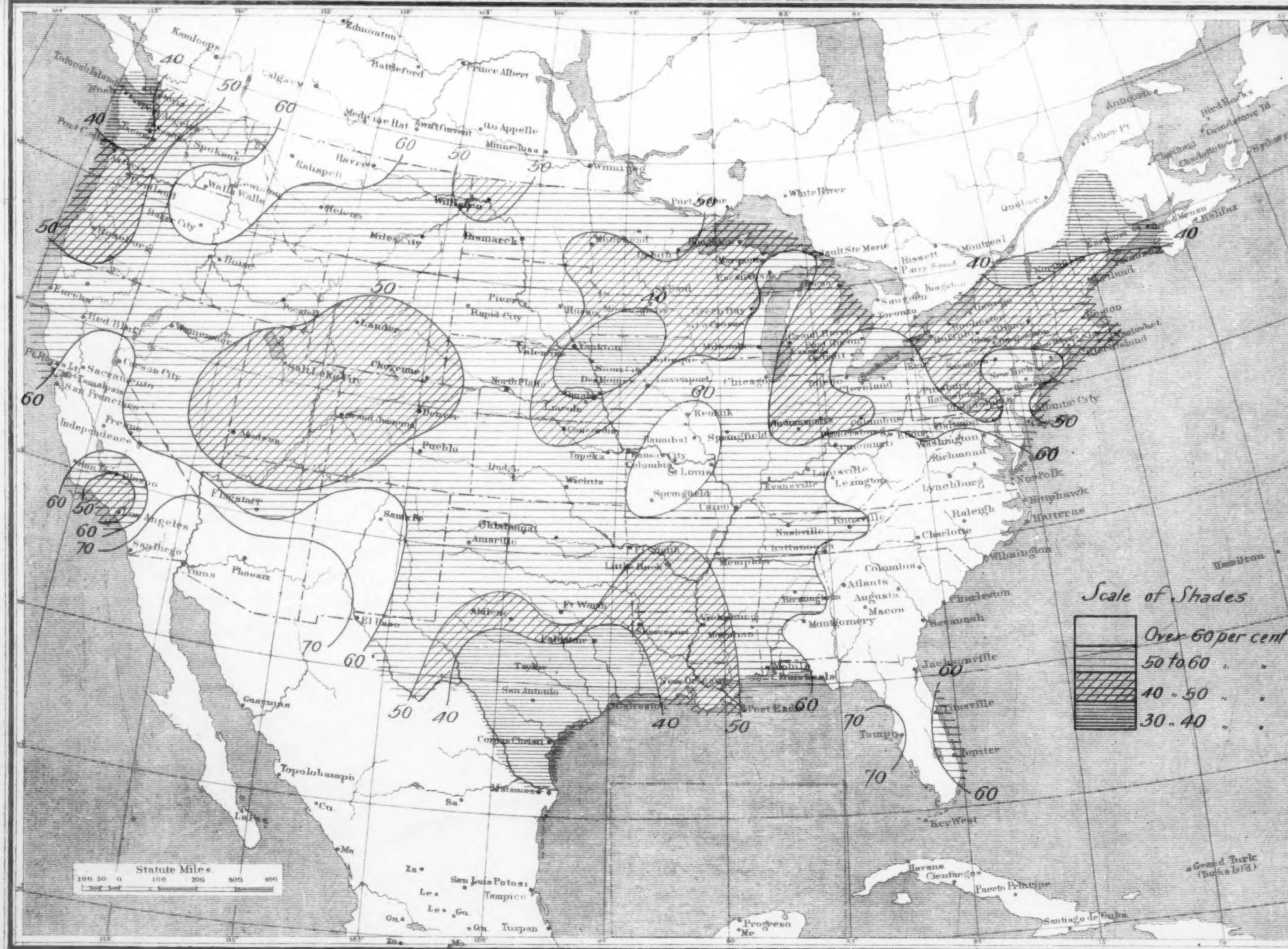
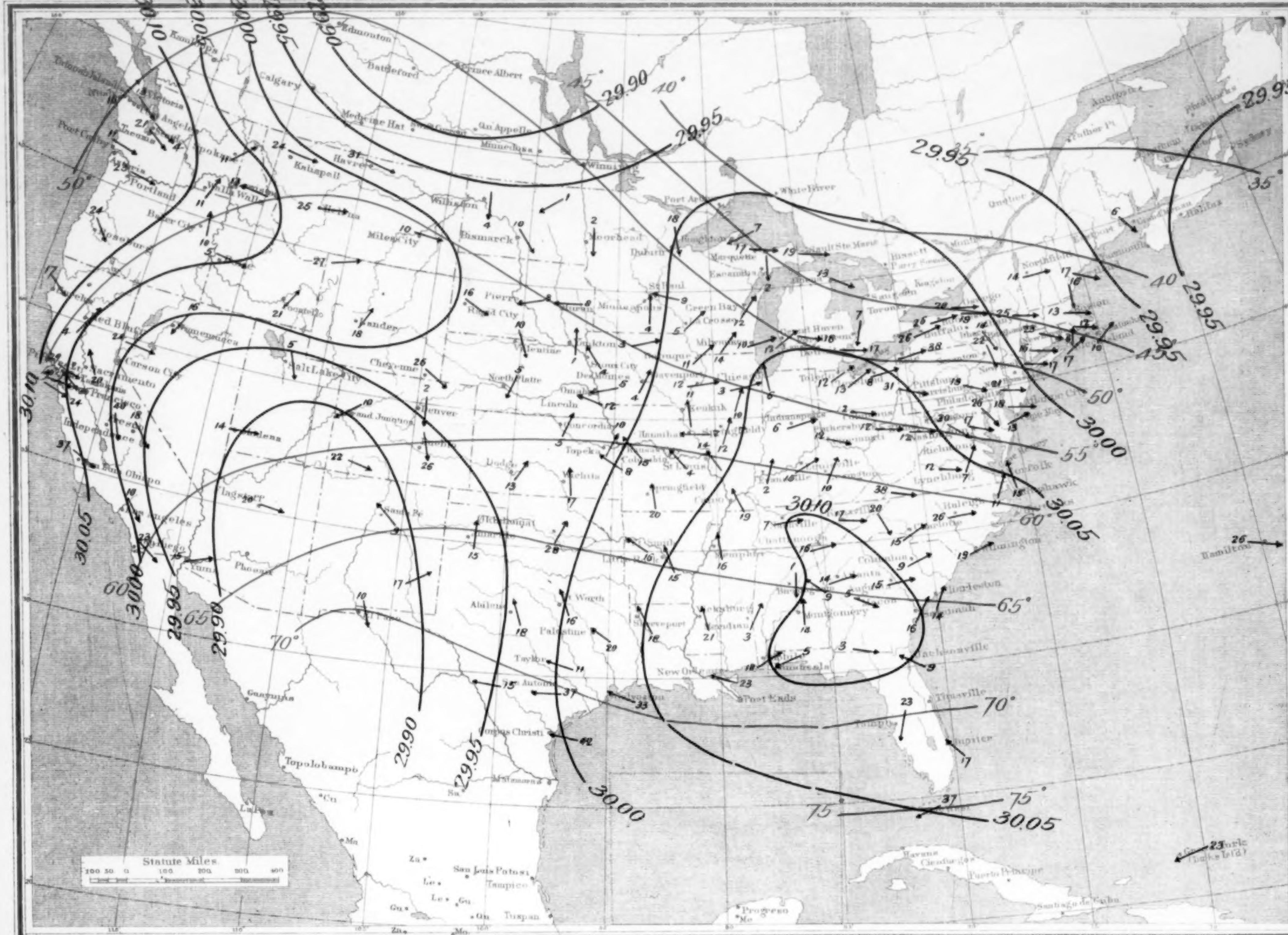


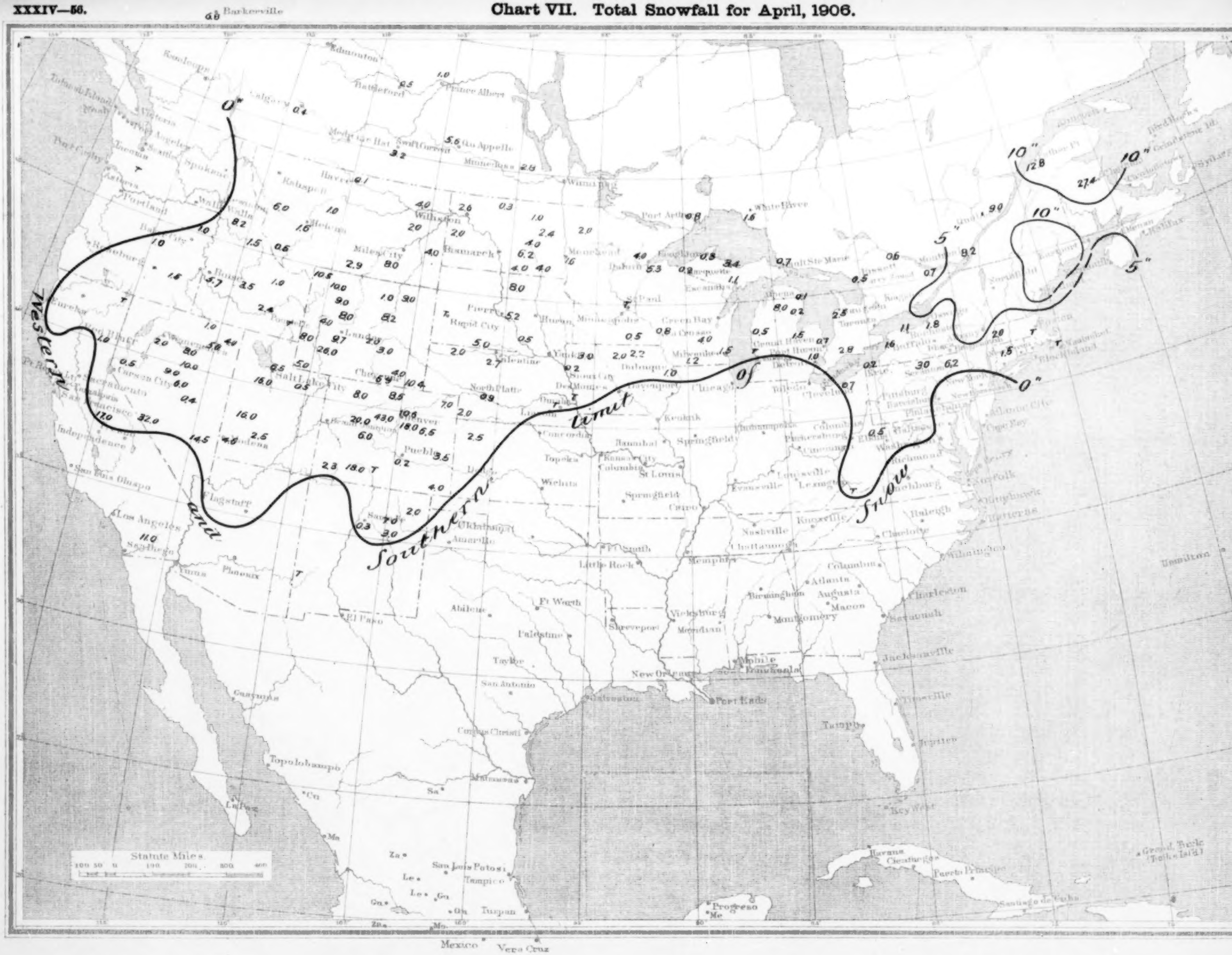
Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, April, 1906.



Barkerville

Chart VII. Total Snowfall for April, 1906.

Chart VII. Total Snowfall for April, 1906.



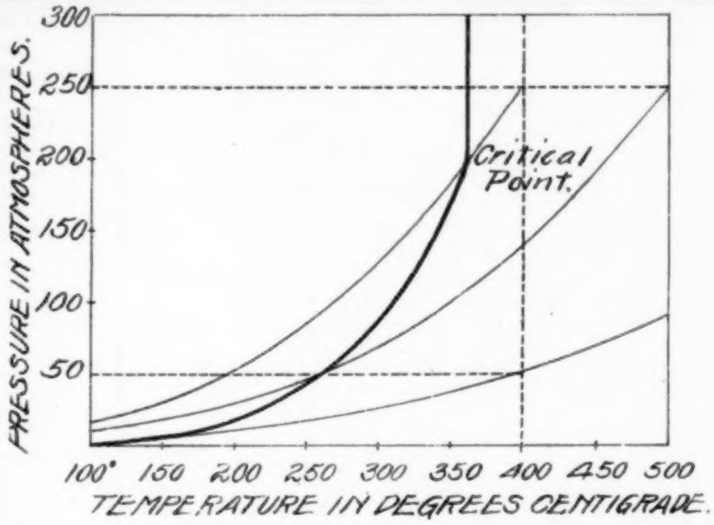


FIG.5.- CONDENSATION CURVE FOR WATER VAPOUR.

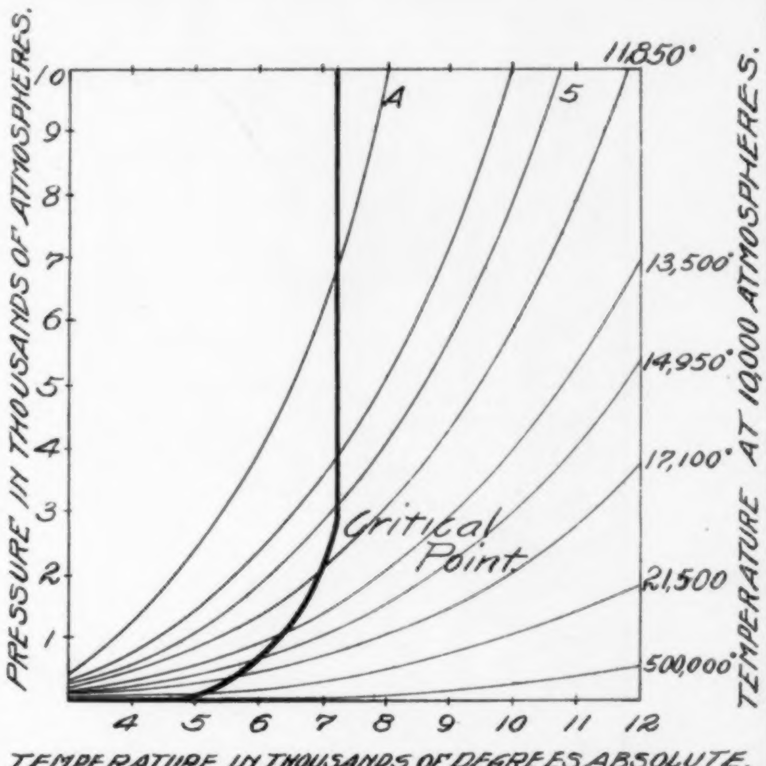


FIG.6.- HYPOTHETICAL CURVES FOR CARBON VAPOUR.

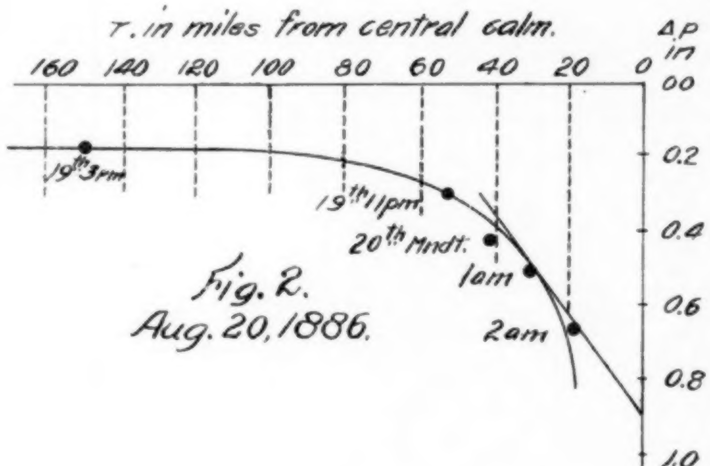


Fig. 2. Aug. 20, 1886.

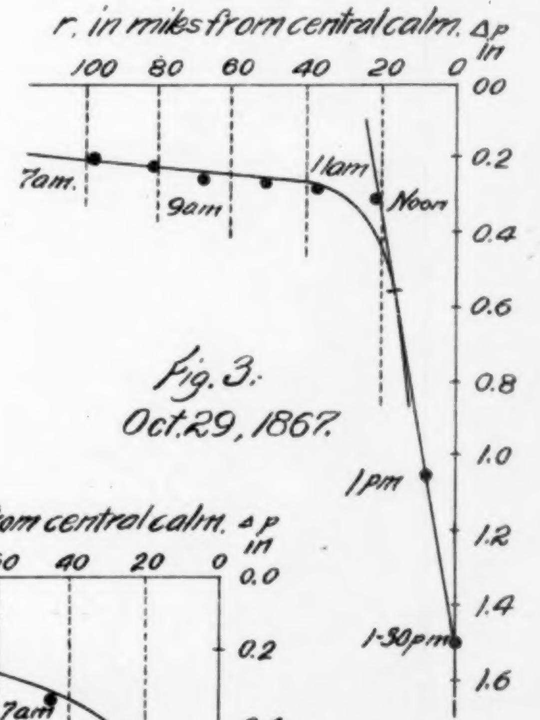


Fig. 3. Oct. 29, 1867.

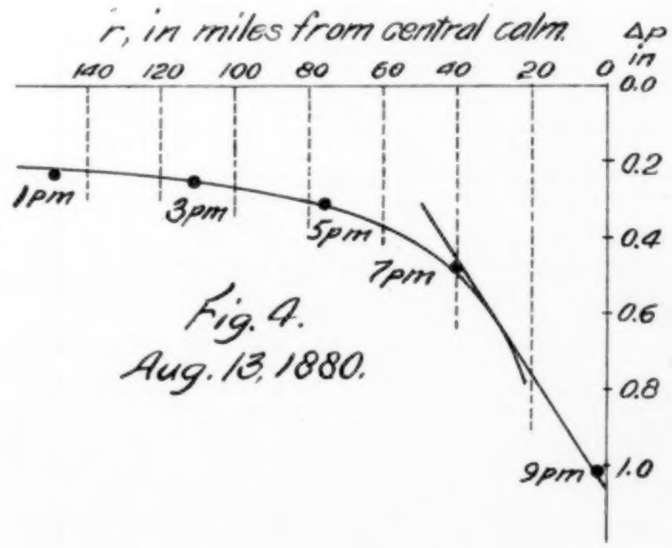


Fig. 4. Aug. 13, 1880.

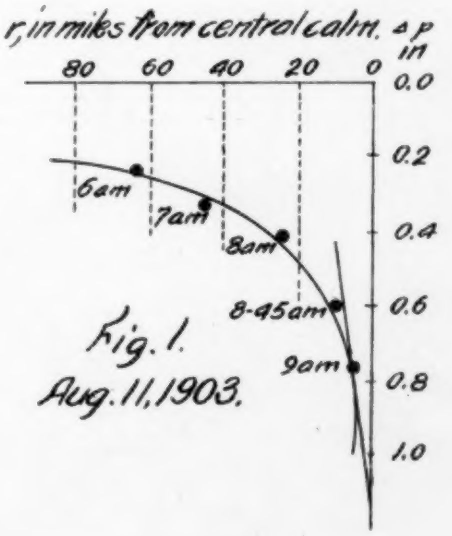


Fig. 1. Aug. 11, 1903.

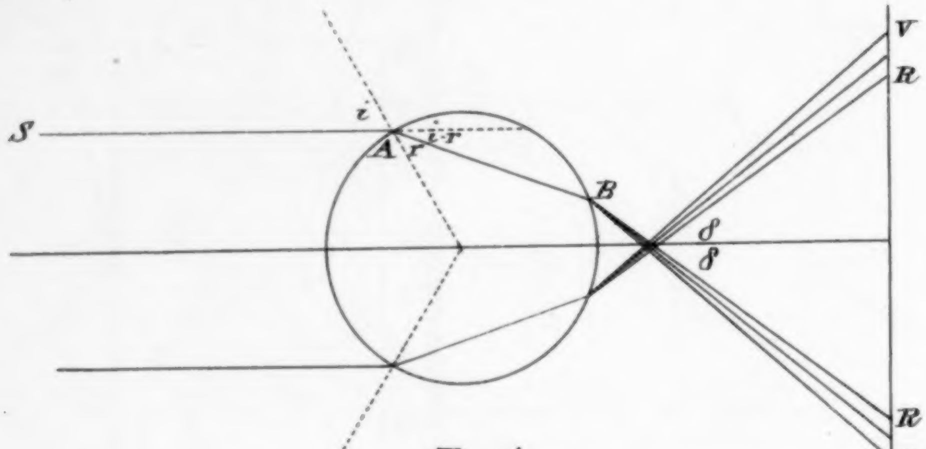


Fig. 1

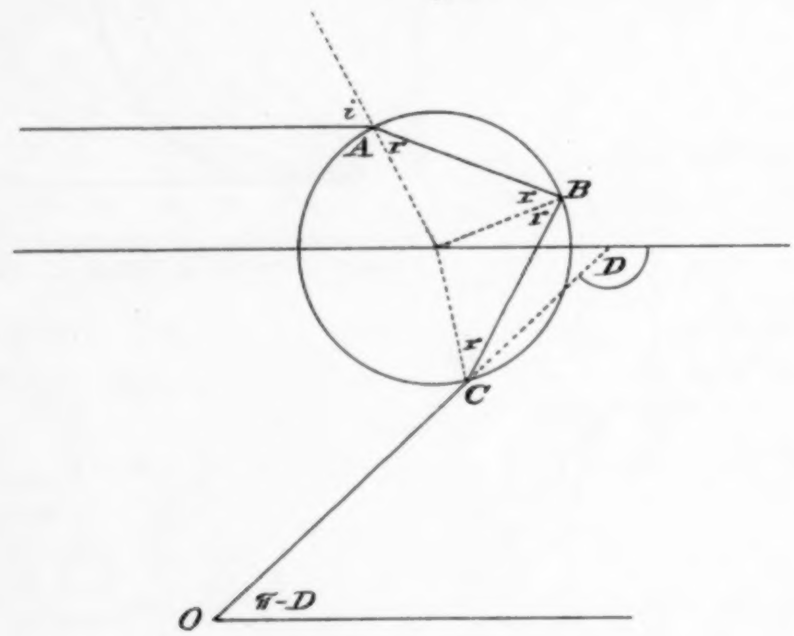


Fig. 2

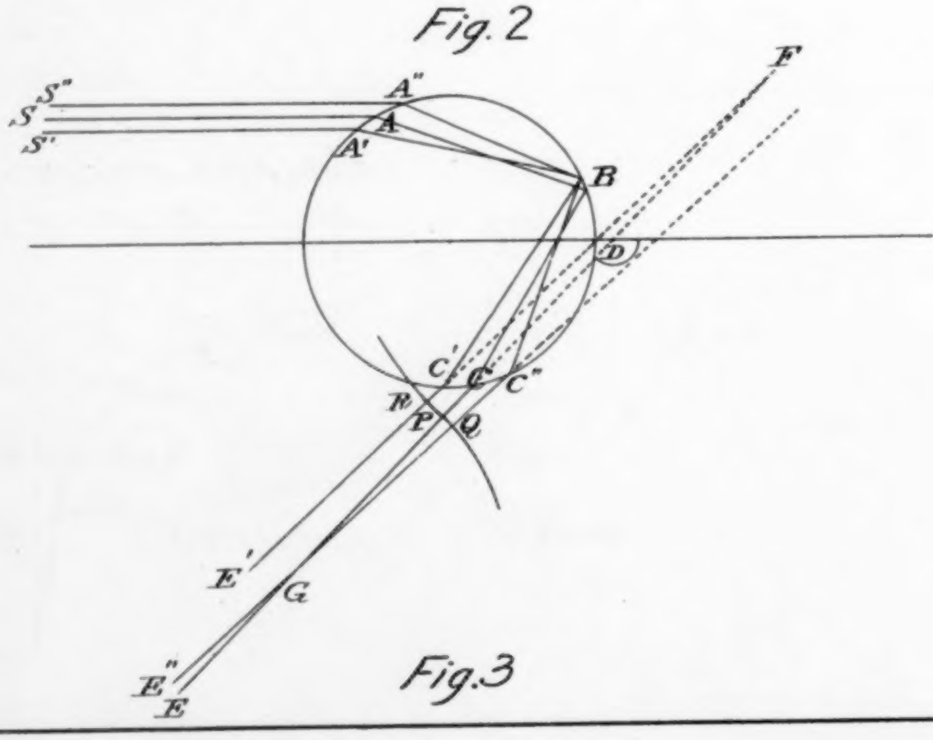


Fig. 3

Chart I. Hydrographs for Seven Principal Rivers of the United States, May, 1906.

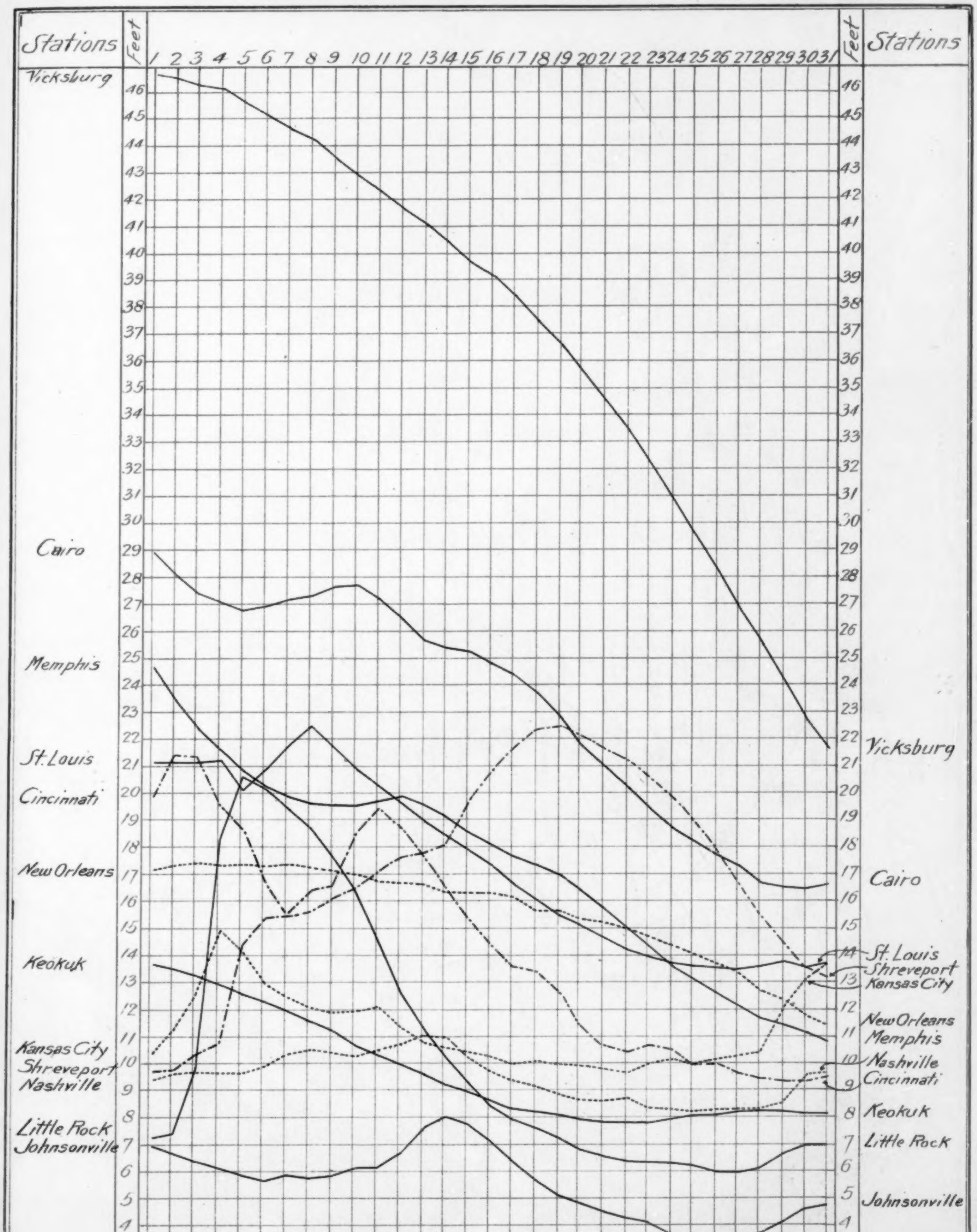


Chart II. Tracks of Centers of High Areas, May, 1906.

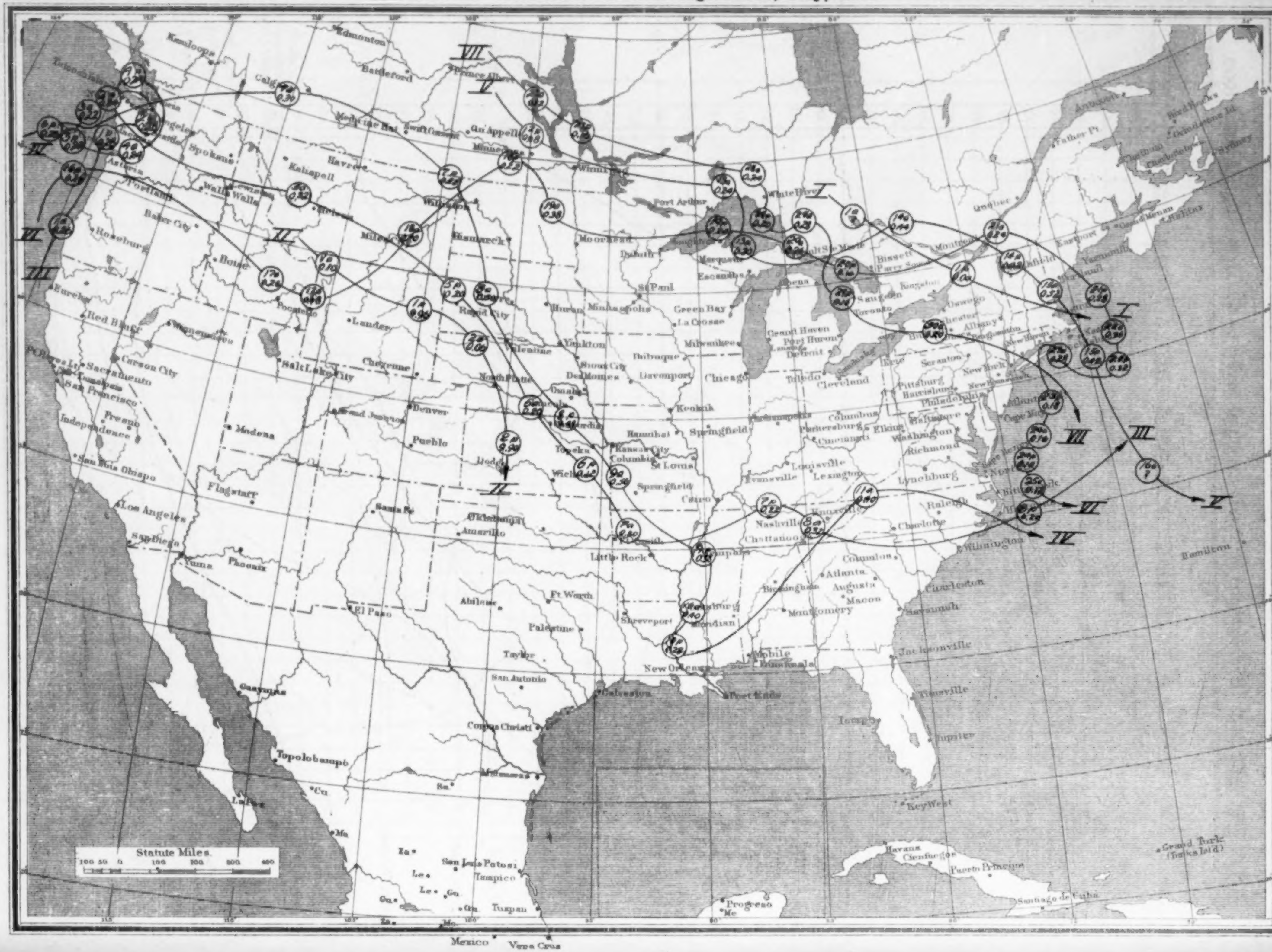


Chart III. Tracks of Centers of Low Areas, May, 1906.

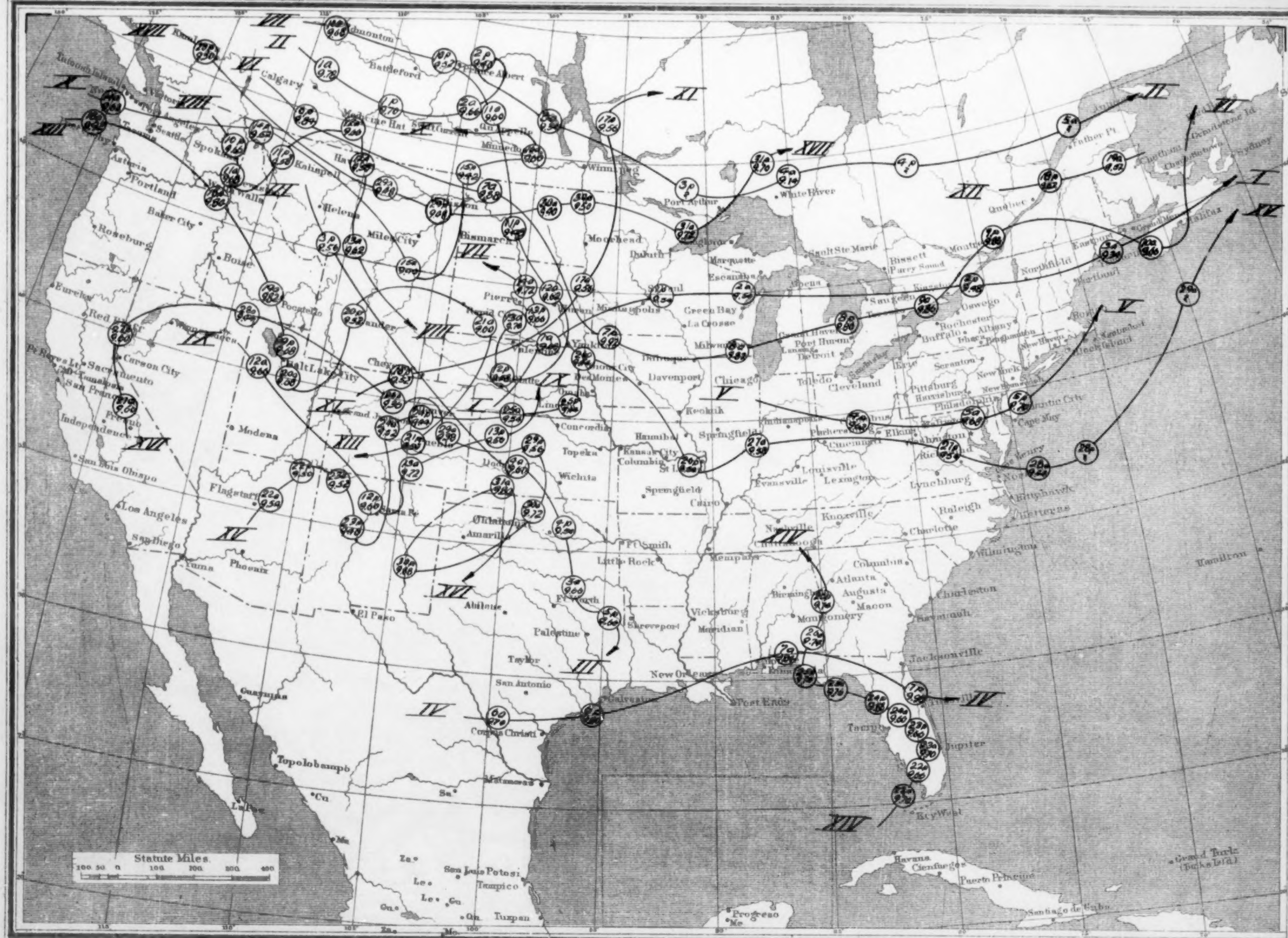


Chart IV. Total Precipitation, May, 1906.

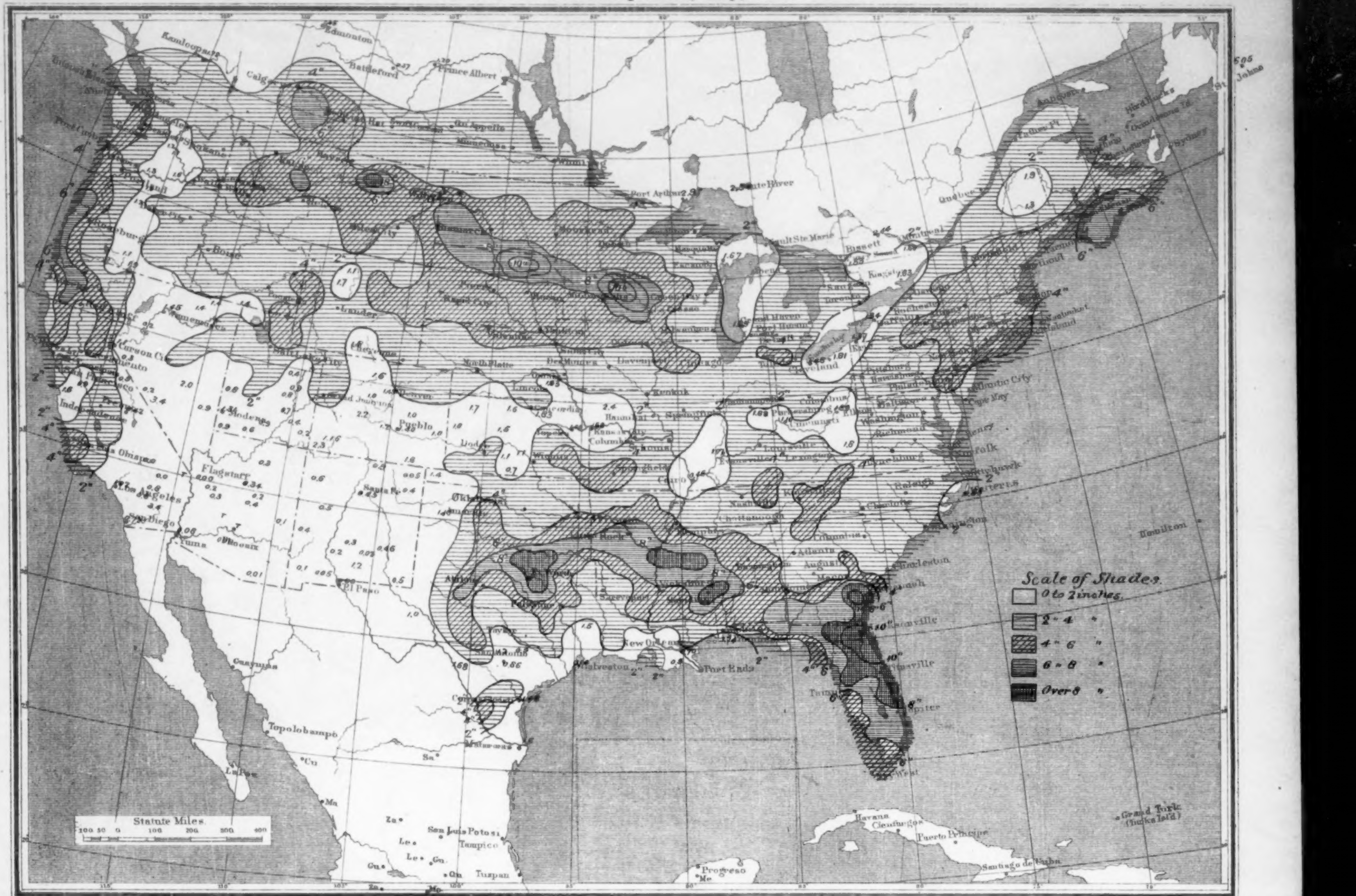
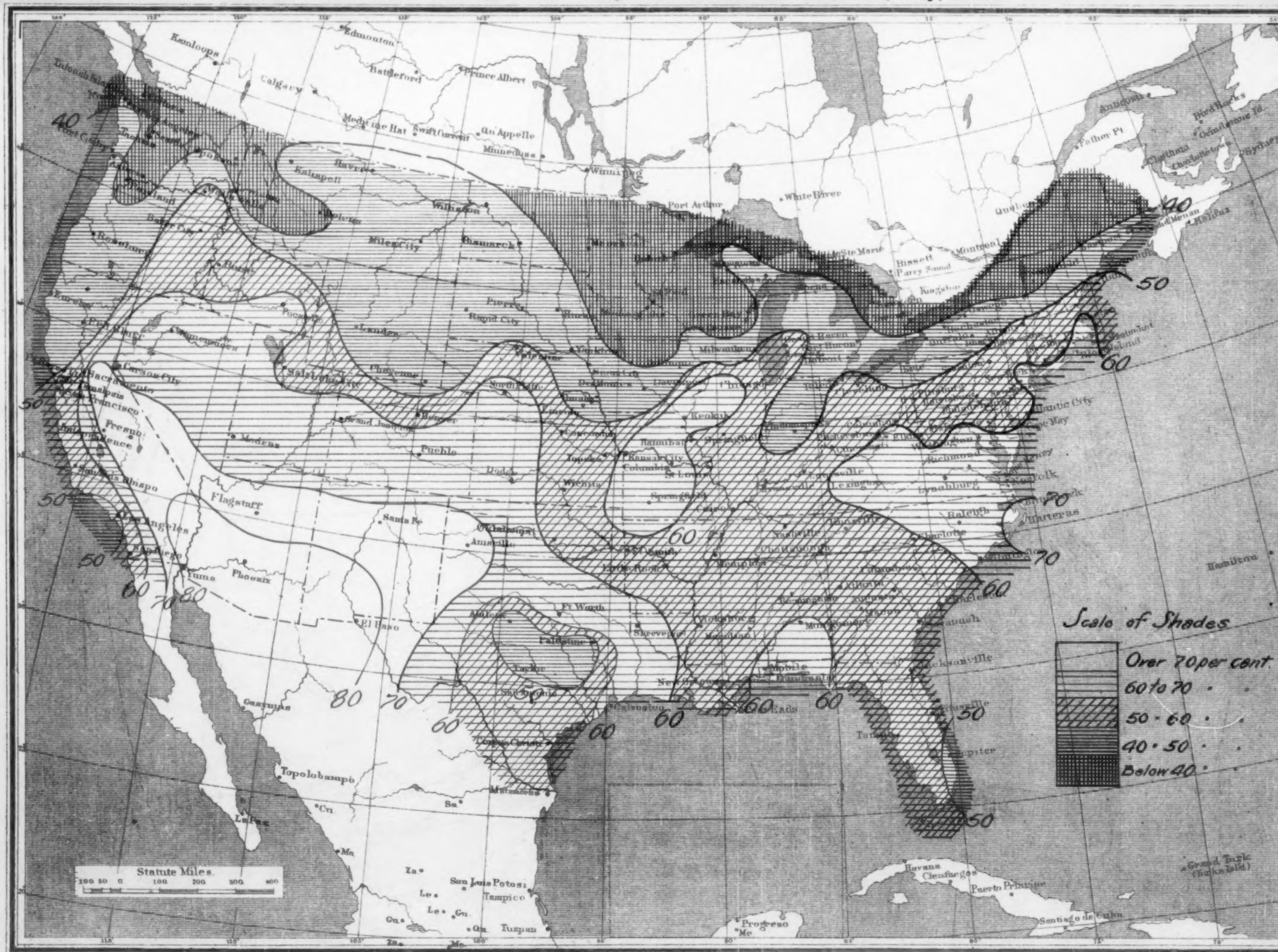


Chart V. Percentage of Clear Sky between Sunrise and Sunset, May, 1906.



Mexico Vera Cruz

Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, May, 1906.

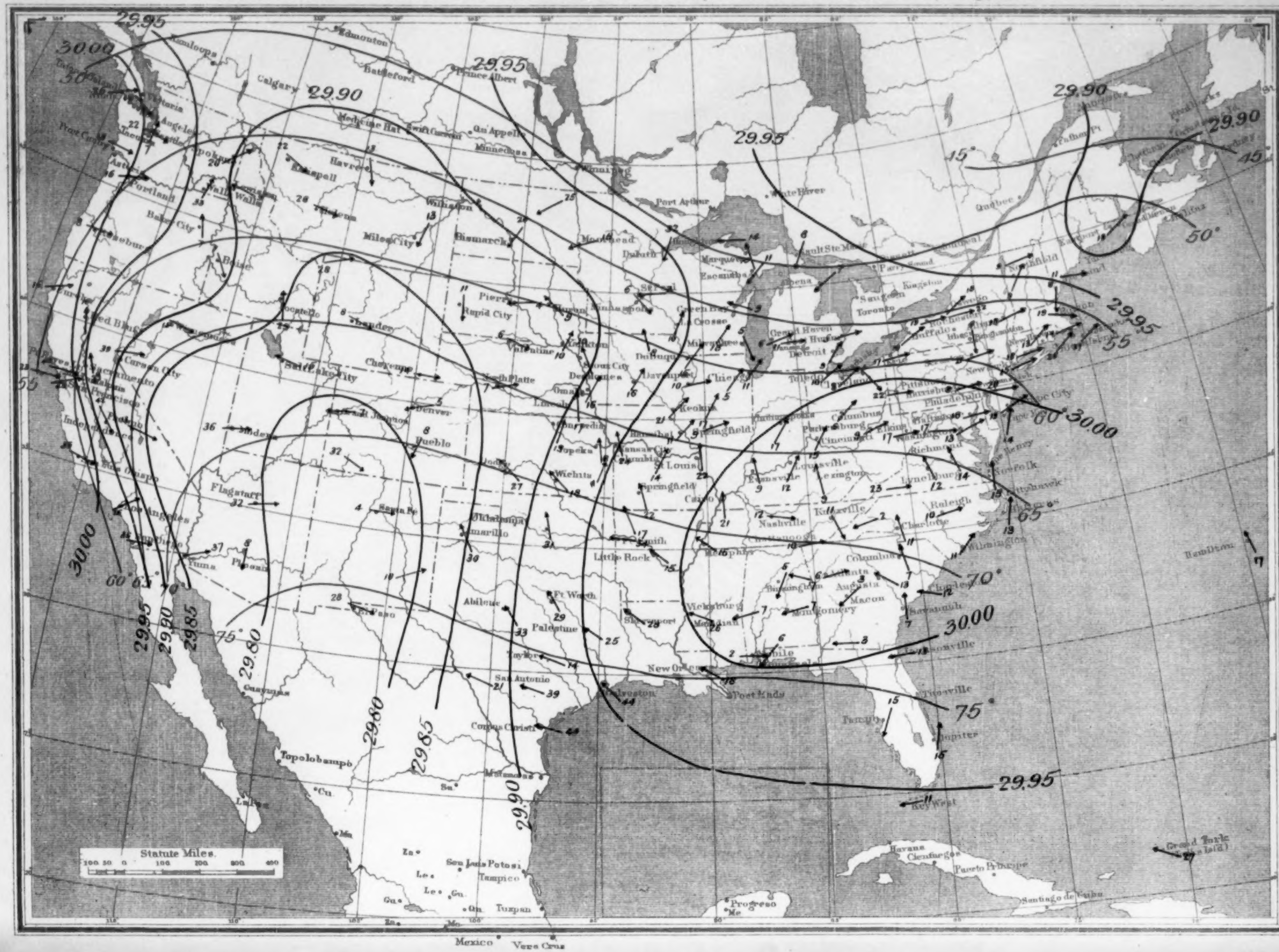
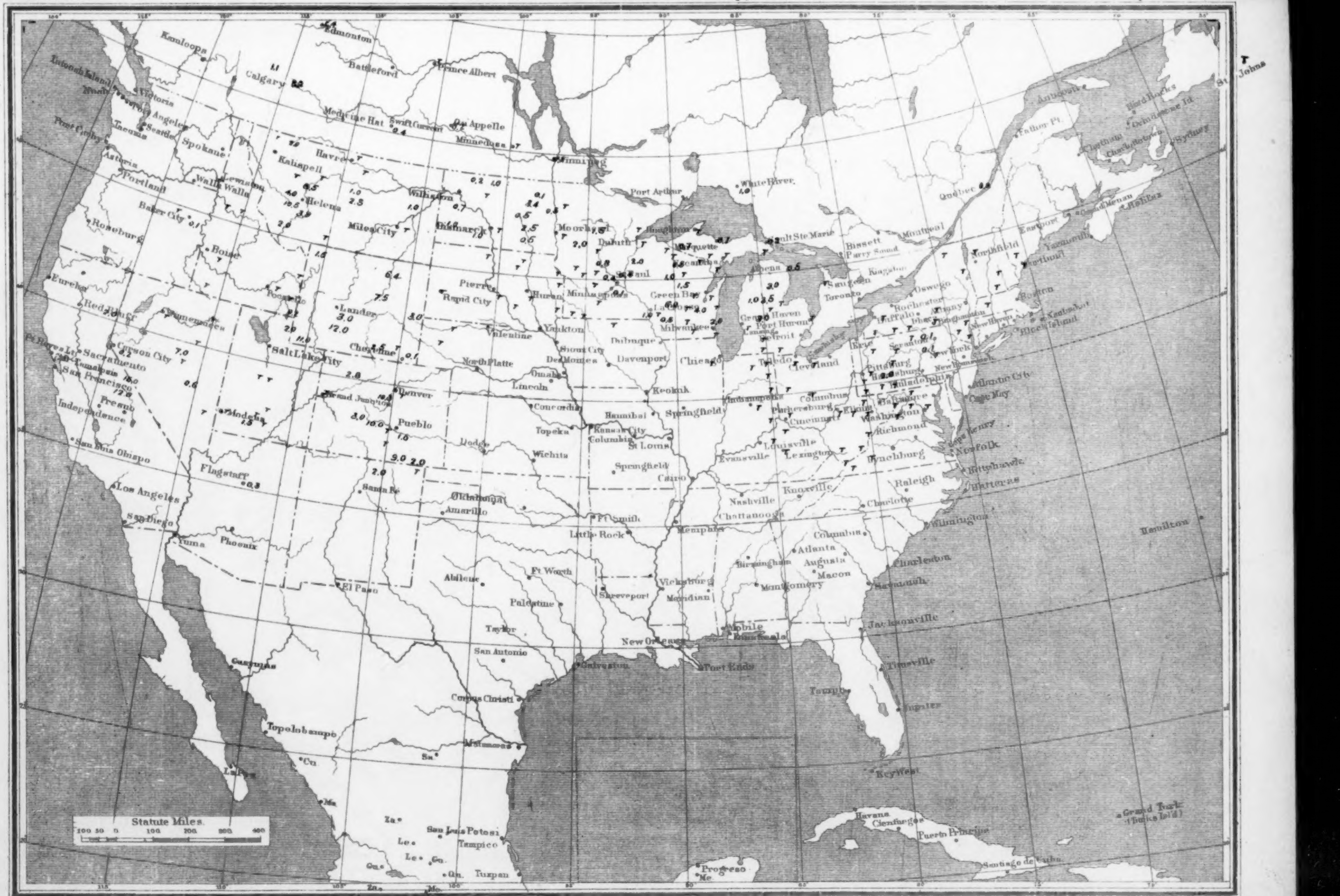
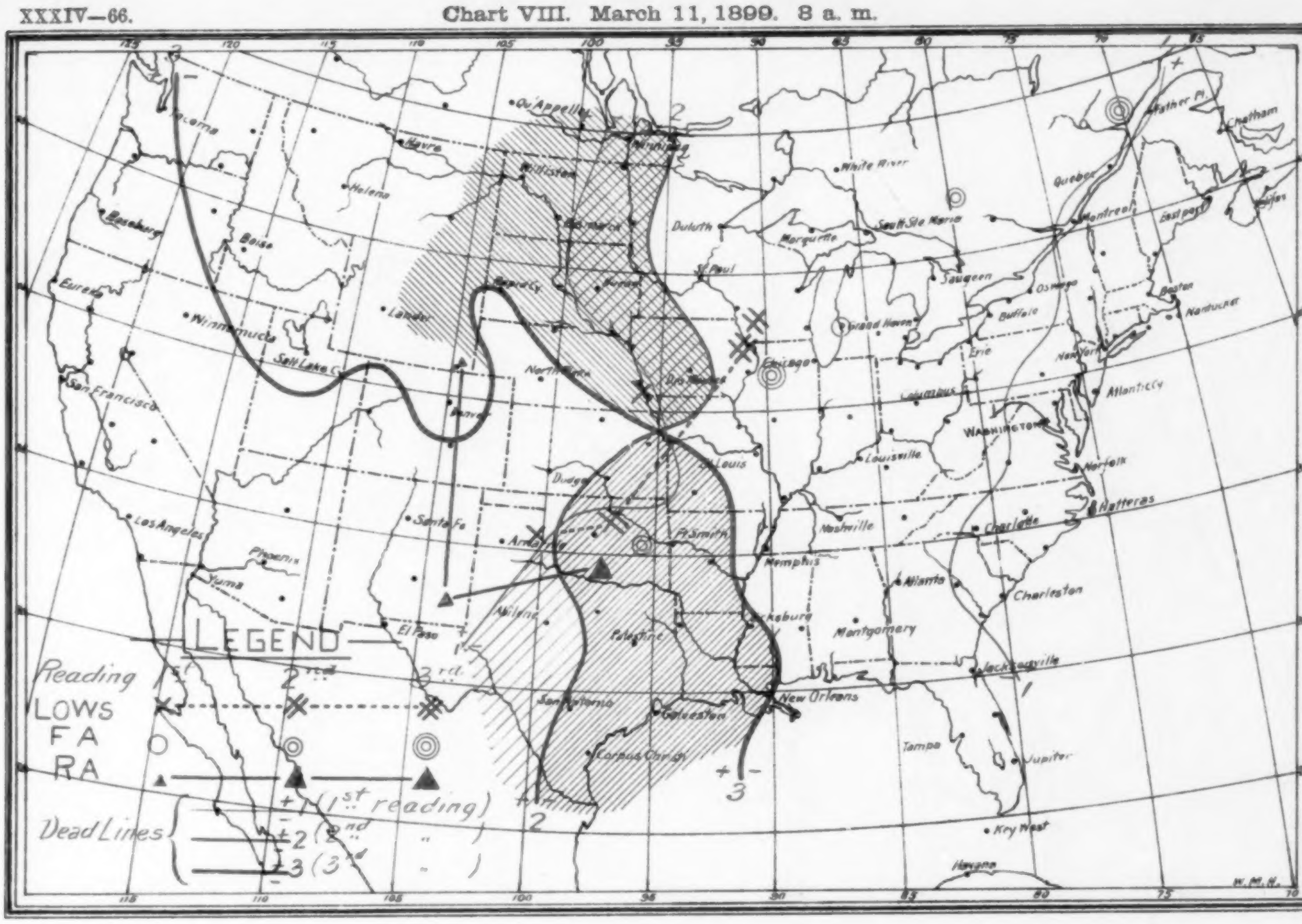


Chart VII. Total Snowfall for May, 1906.



XXXIV—66. Chart VIII. March 11, 1899. 8 a. m.



XXXIV—67. Chart IX. March 7, 1902. 8 p. m.

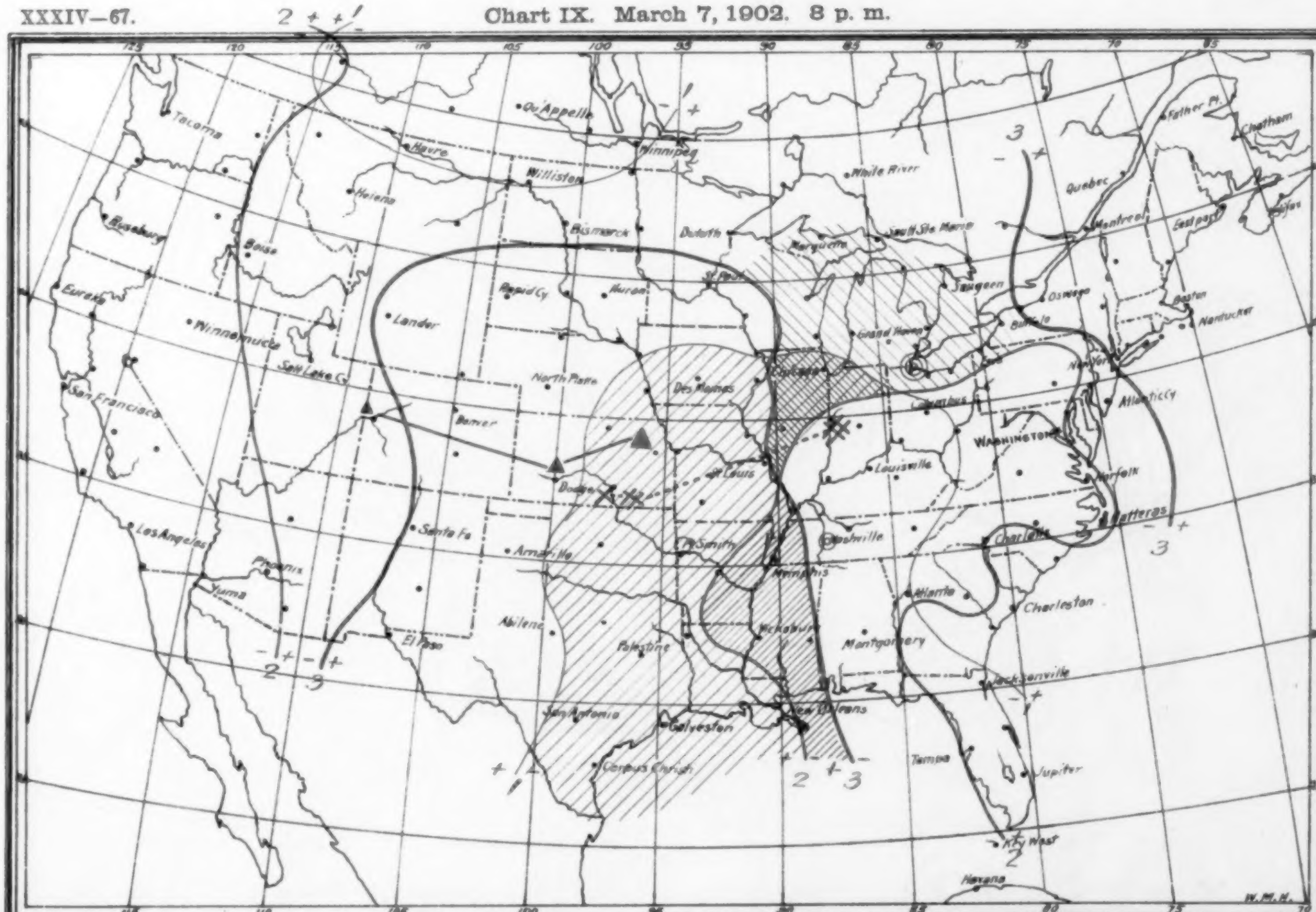


Chart X. March 25, 1901. 8 p. m.

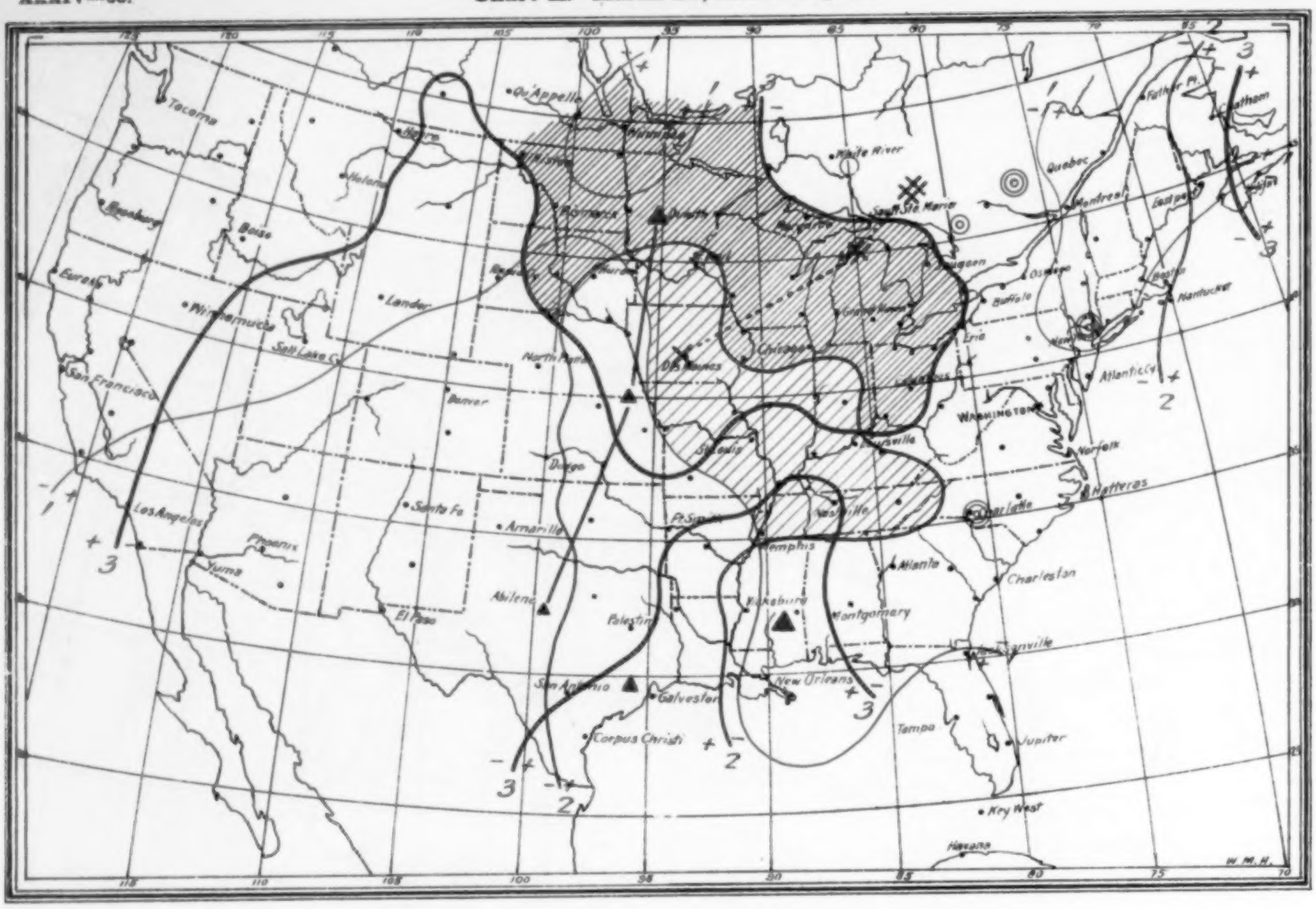


Chart XI. March 6, 1900. 8 a. m.

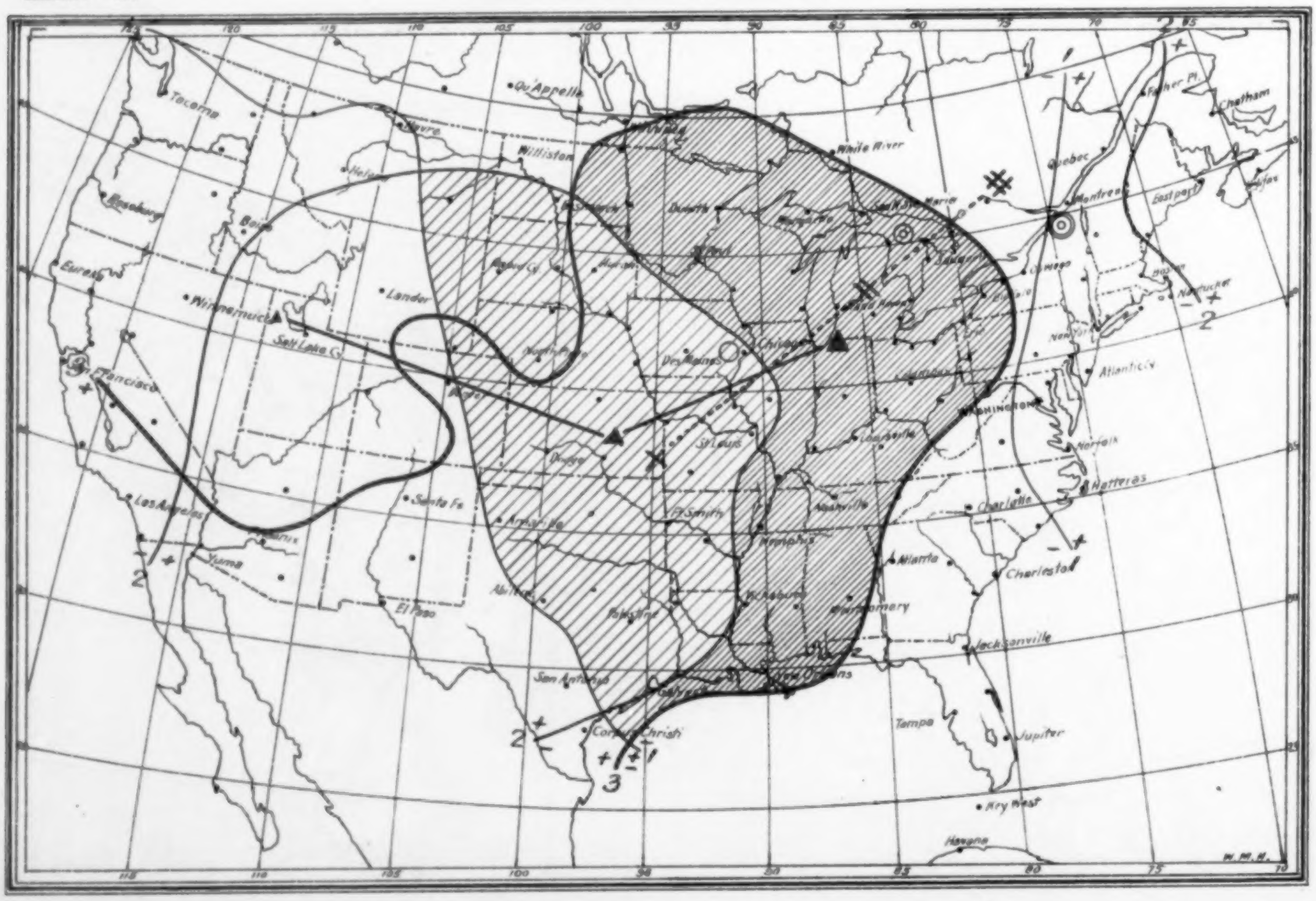


Chart XII. January 6, 1899. 8 a. m.

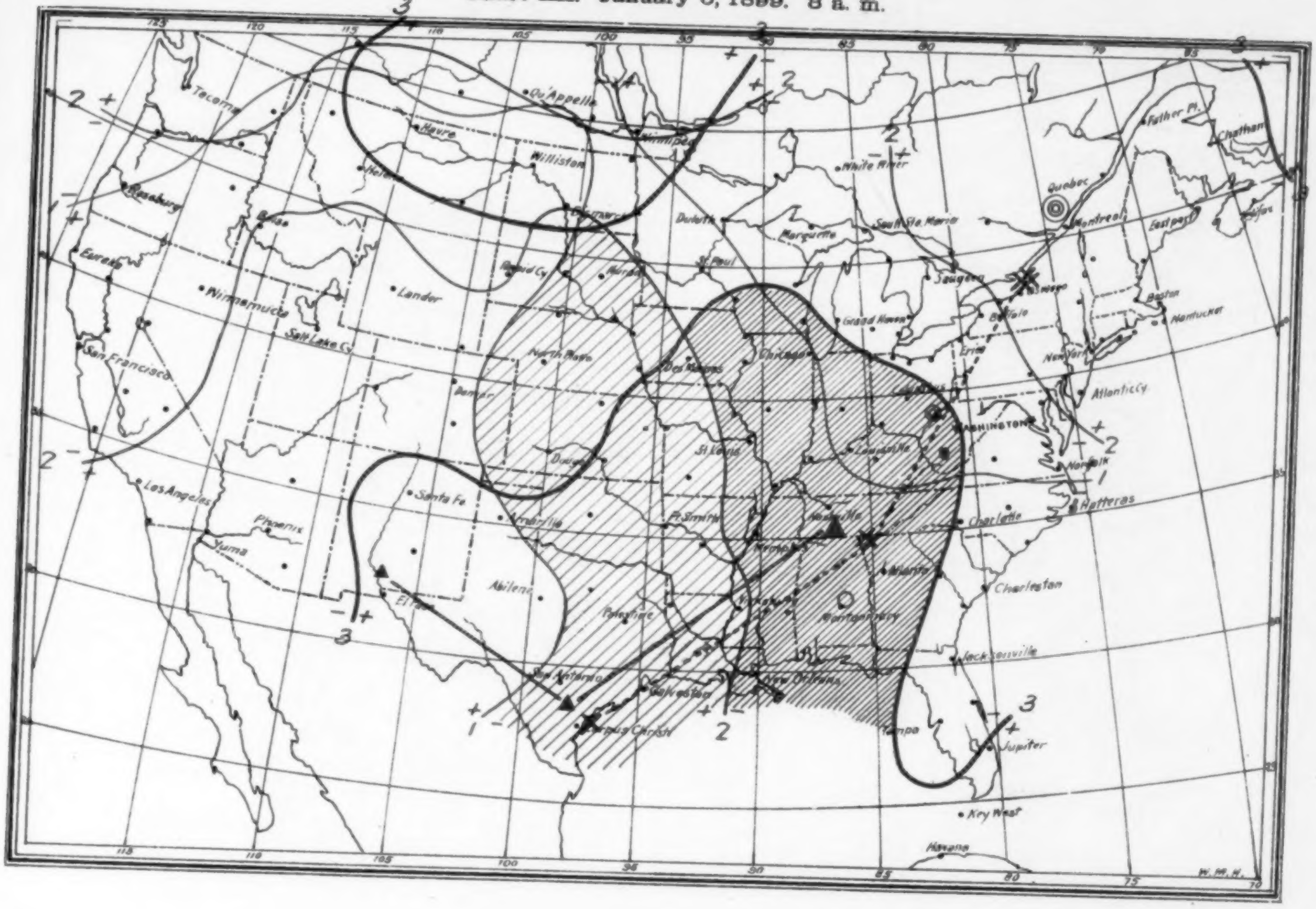
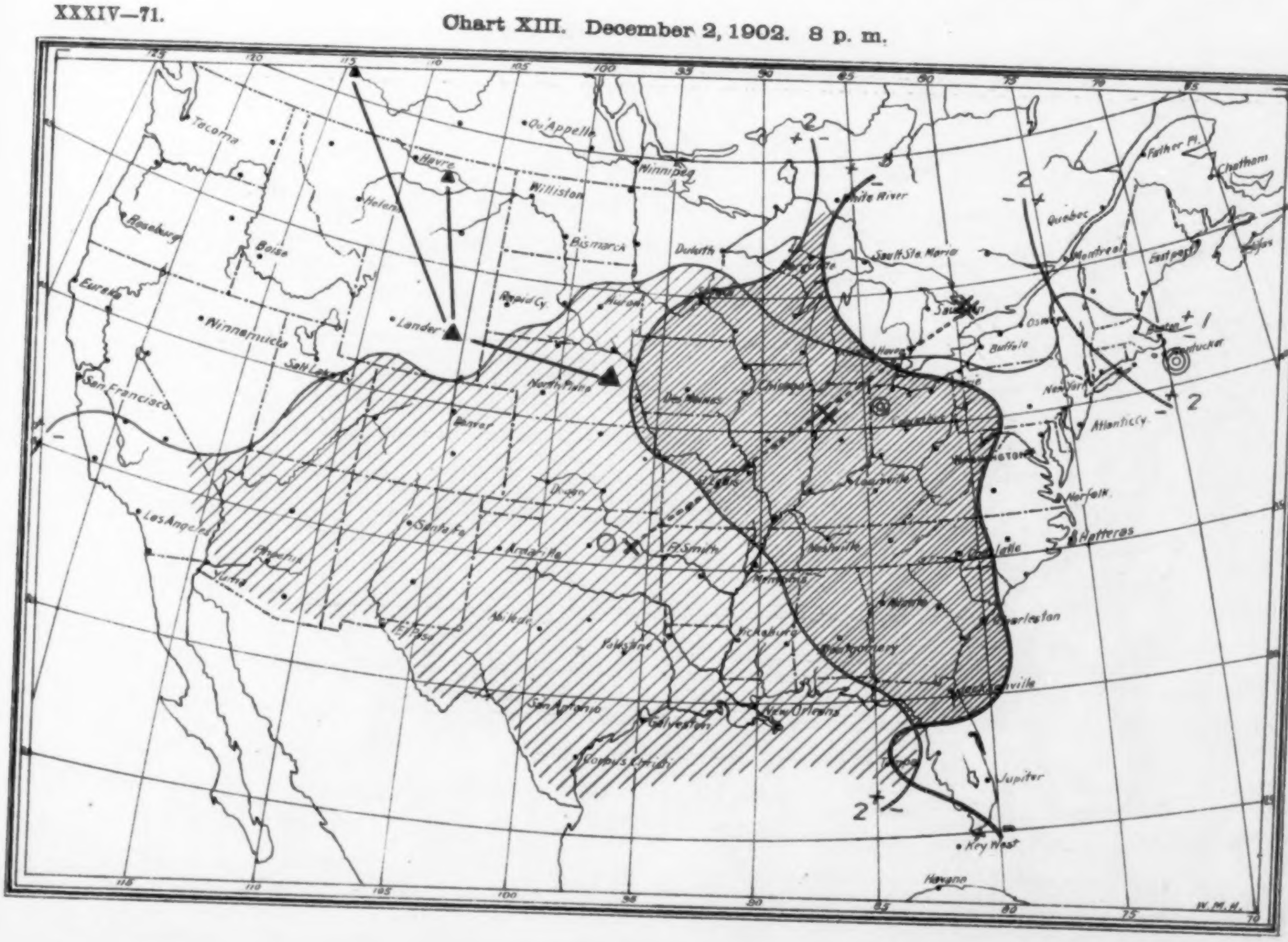
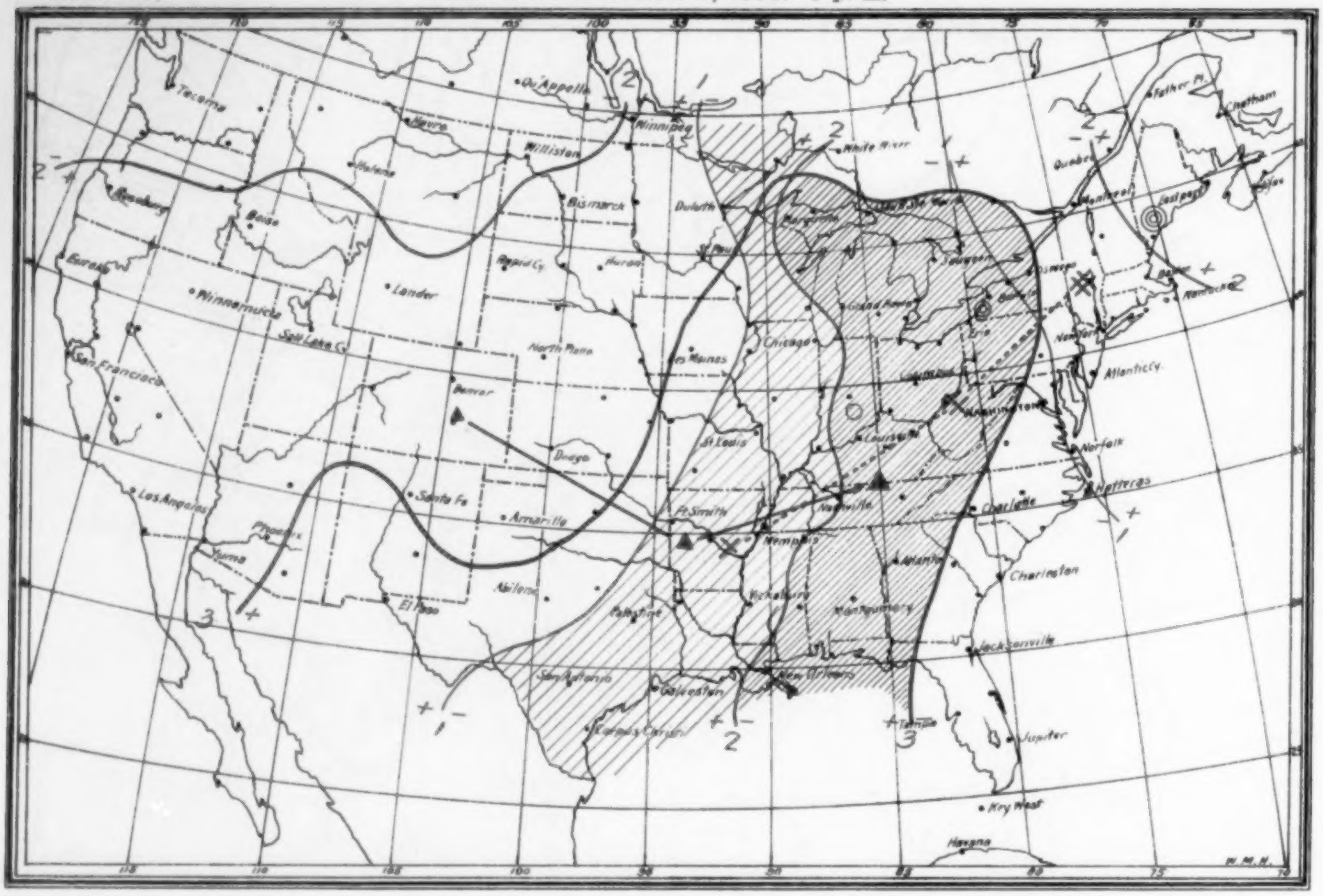


Chart XIII. December 2, 1902. 8 p. m.



XXXIV—72. Chart XIV. December 5, 1893. 8 p. m.



XXXIV—73. Chart XV. January 5, 1893. 8 a. m.

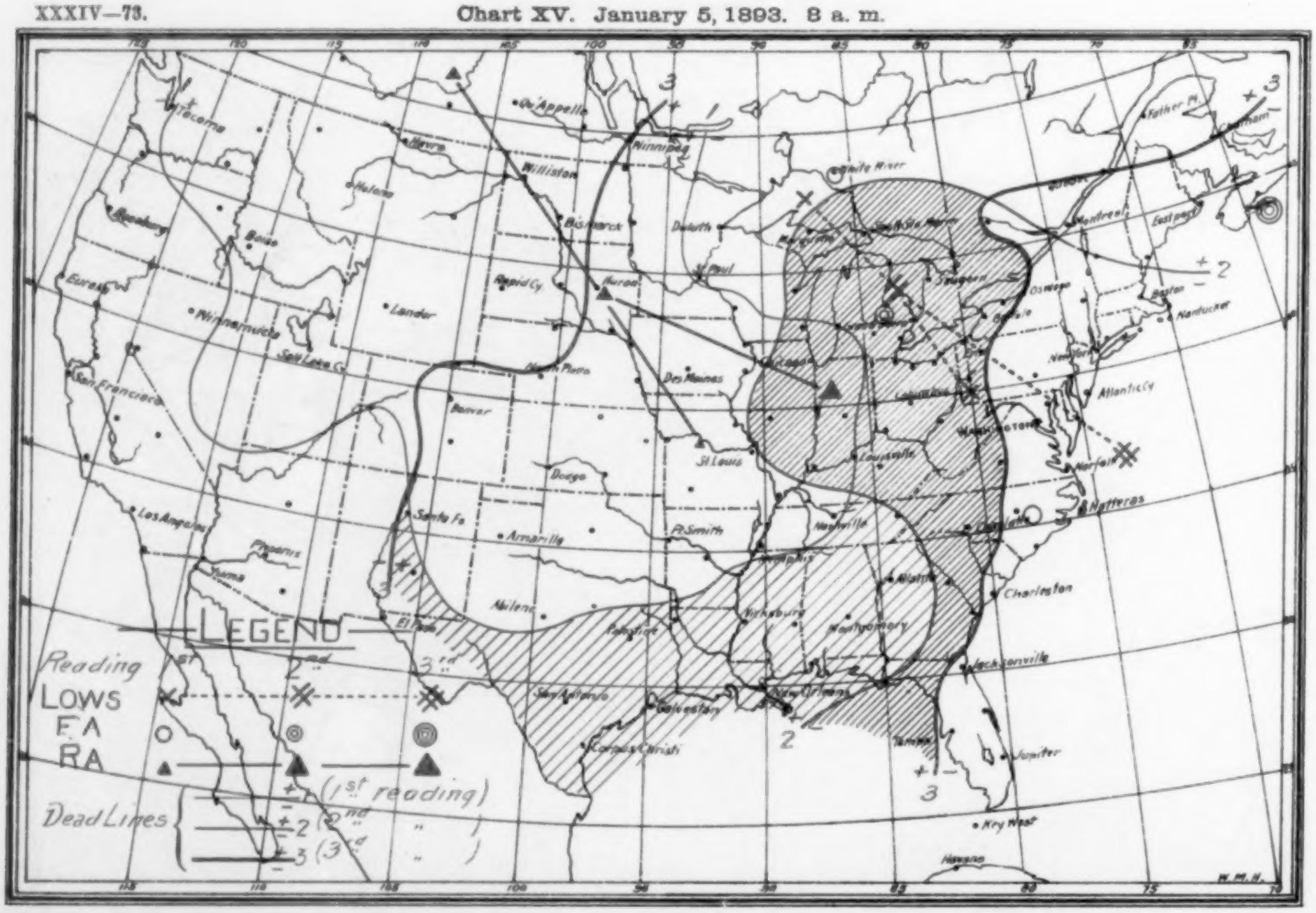


Chart I. Hydrographs for Seven Principal Rivers of the United States, June, 1906.

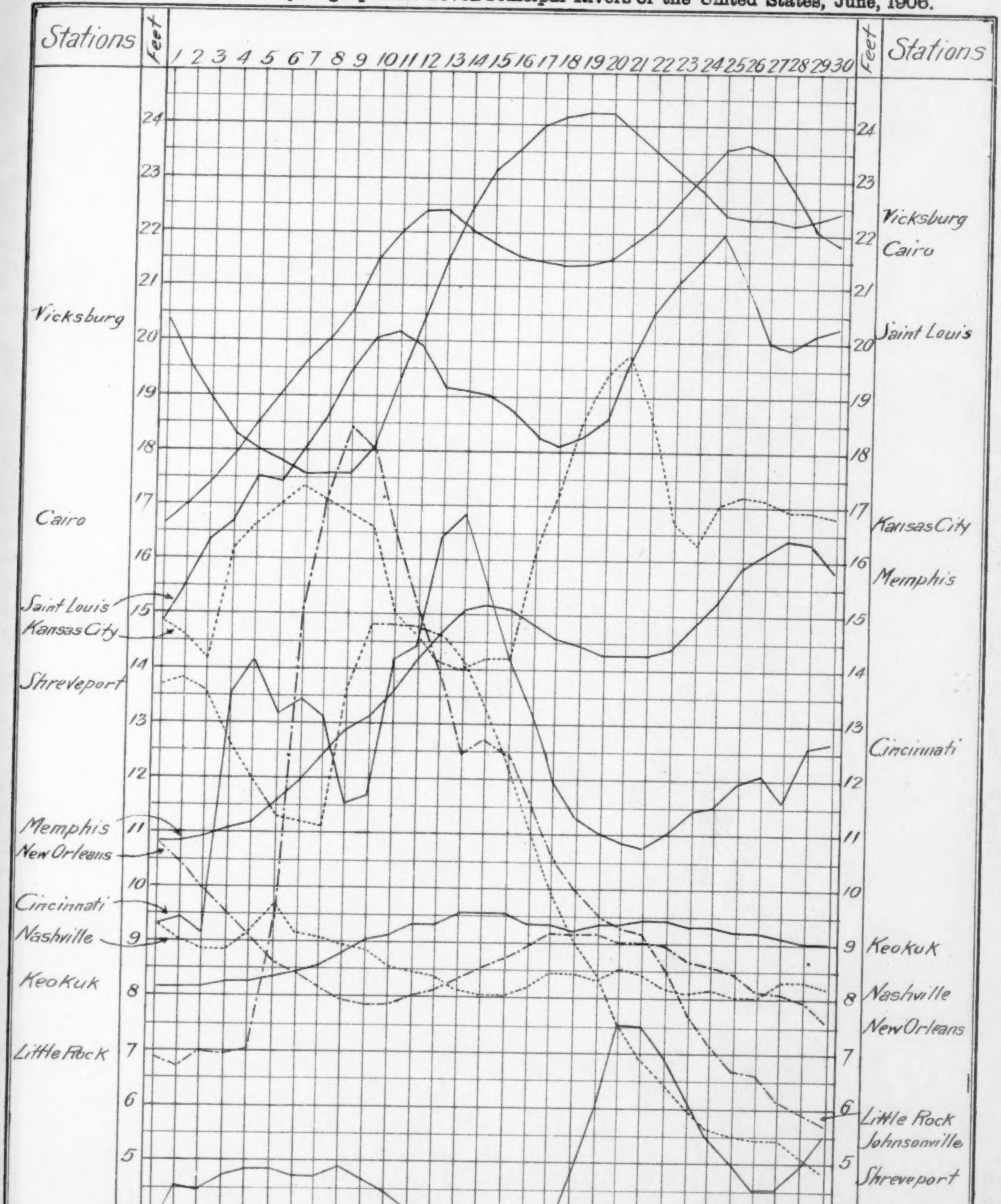
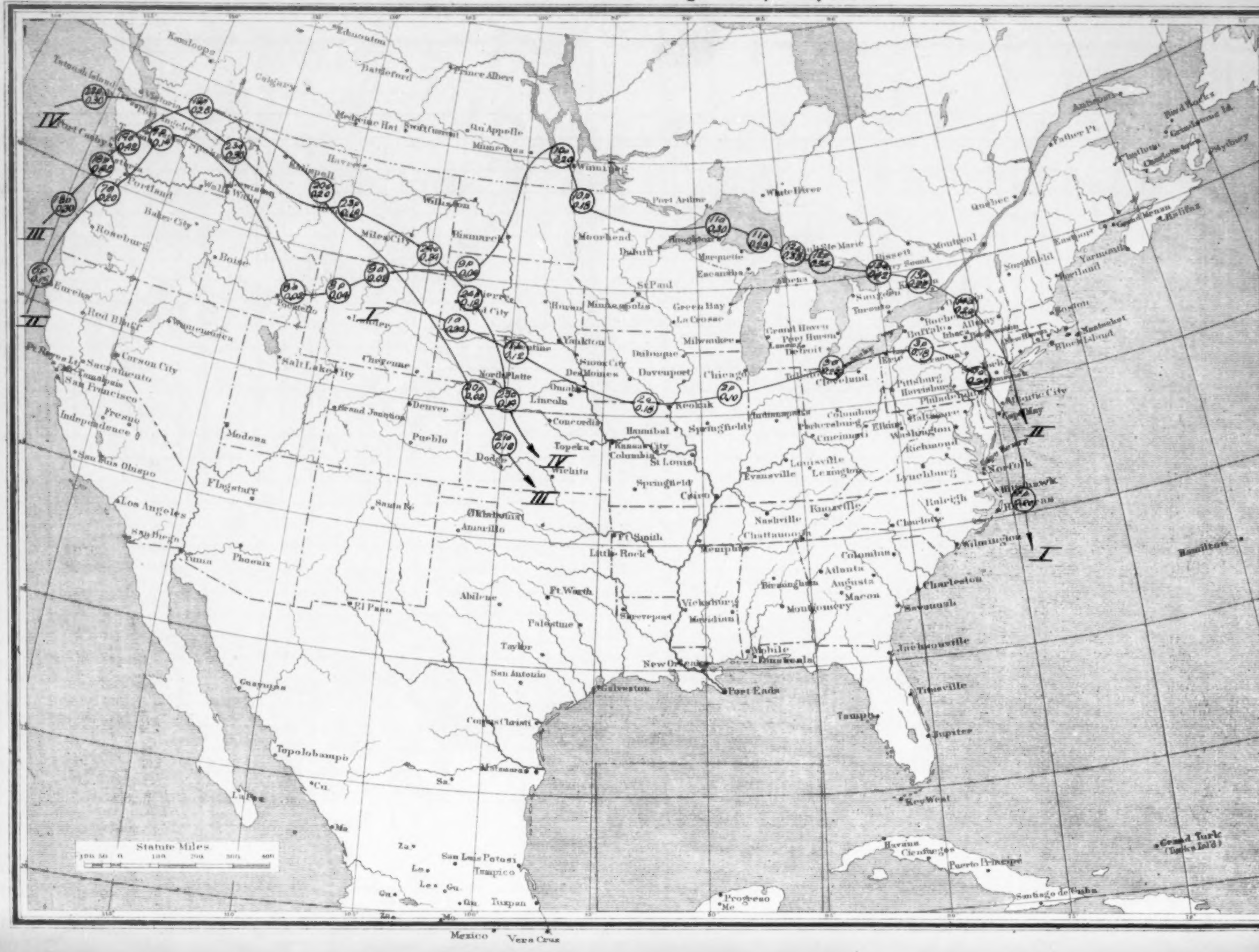


Chart II. Tracks of Centers of High Areas, June, 1906.



XXXIV—76.

Chart III. Tracks of Centers of Low Areas, June, 1906.

Chart III. Tracks of Centers of Low Areas, June, 1906.

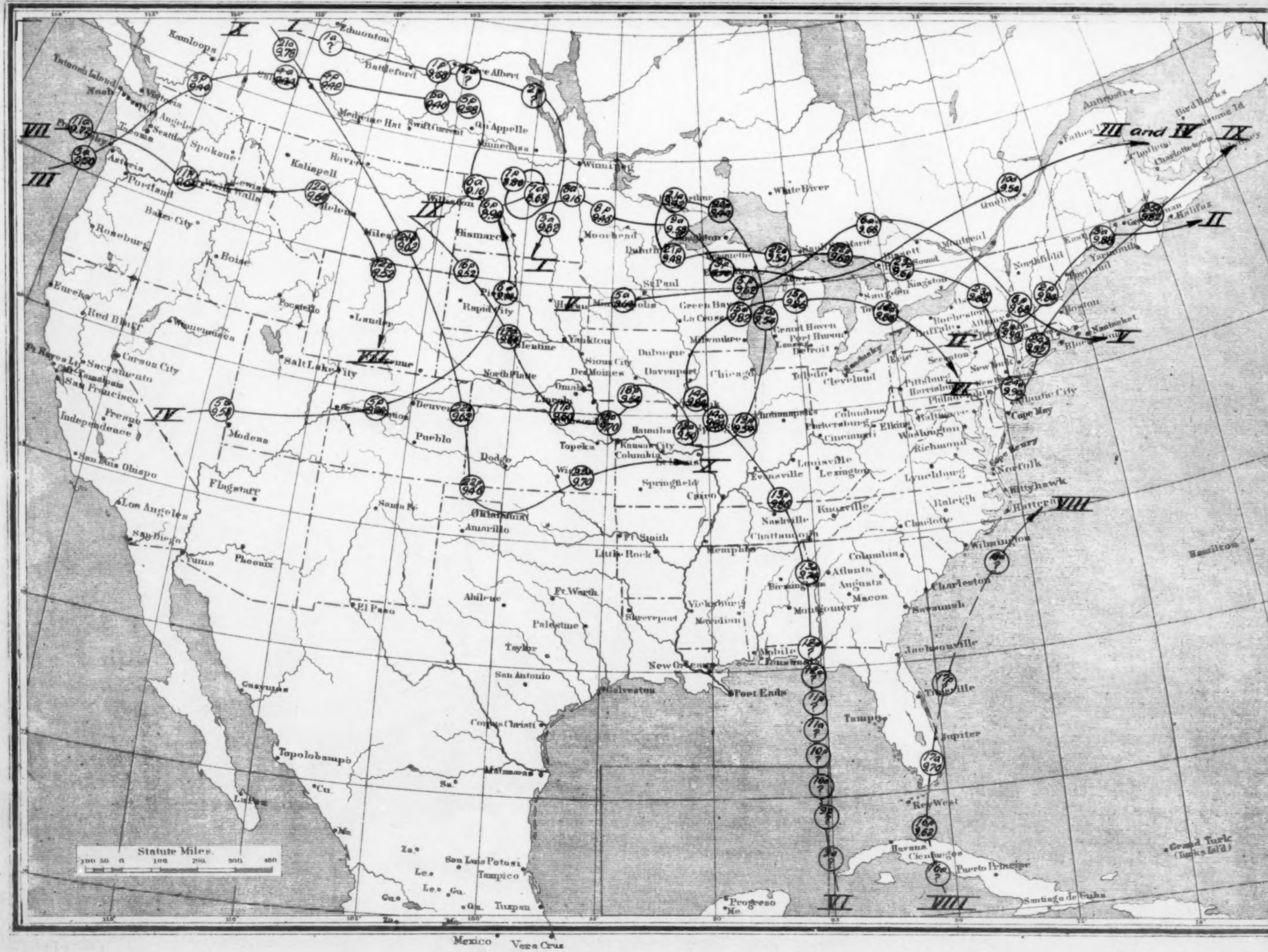


Chart IV. Total Precipitation, June, 1906.

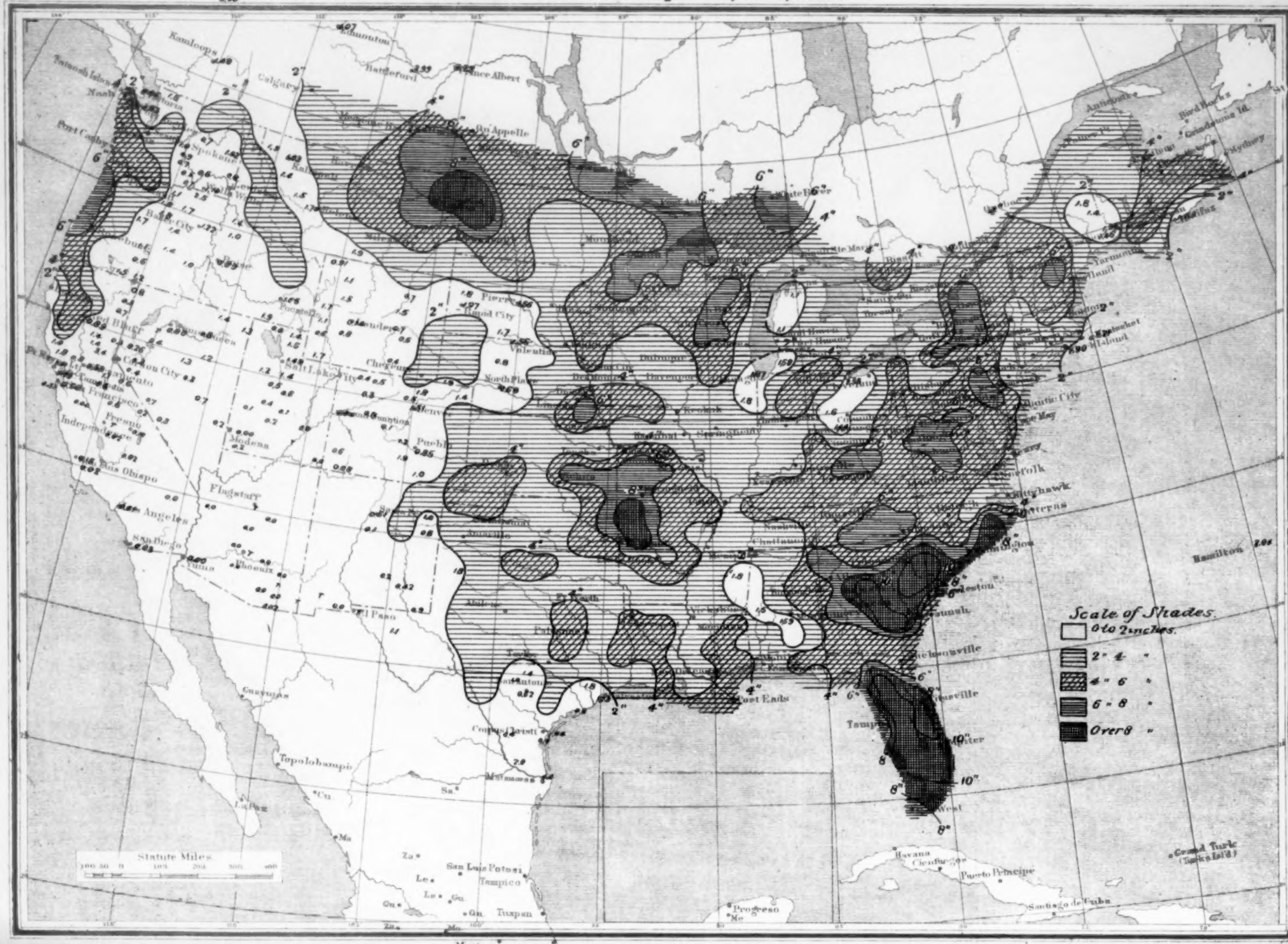


Chart V. Percentage of Clear Sky between Sunrise and Sunset, June, 1906.

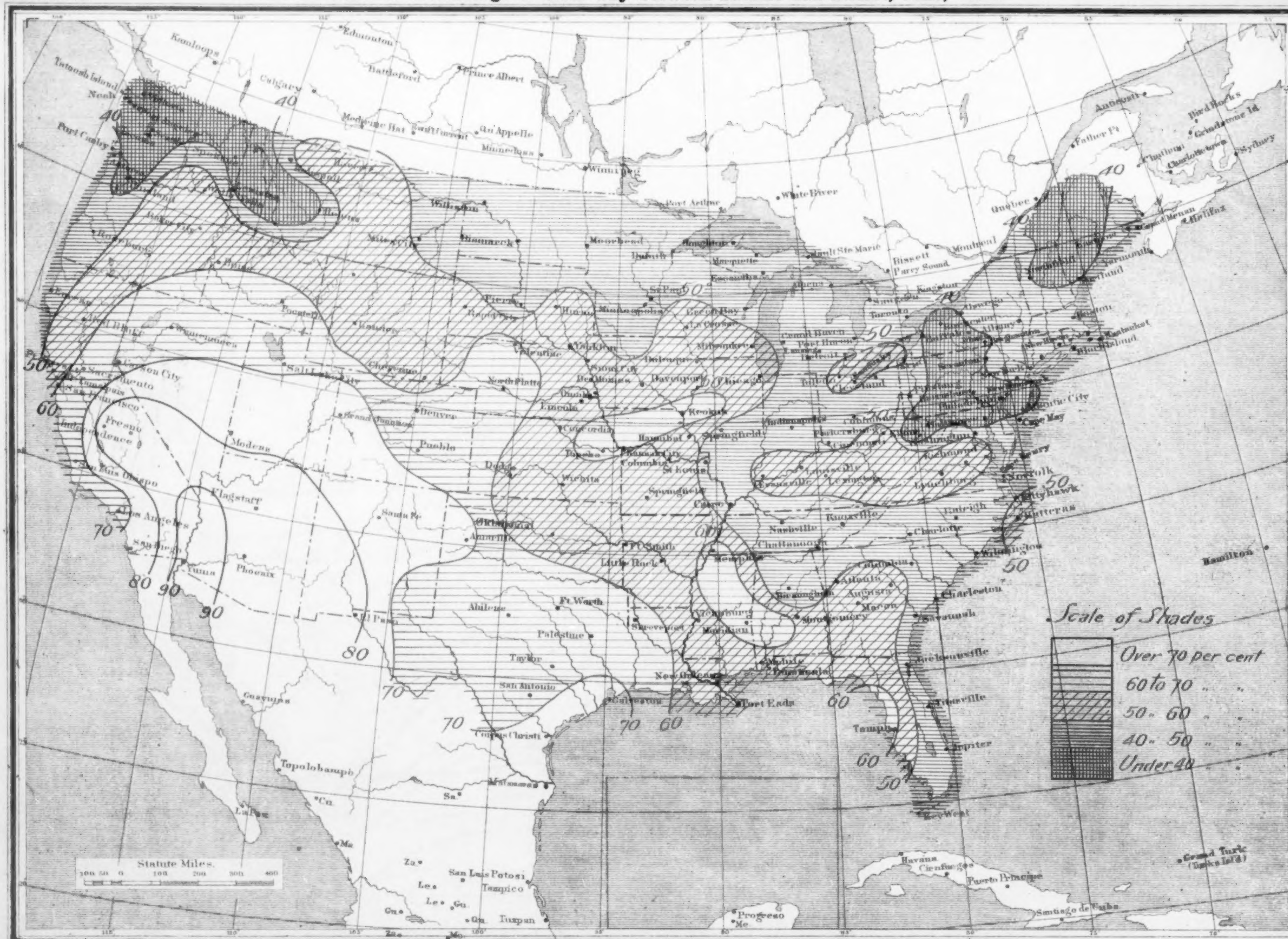
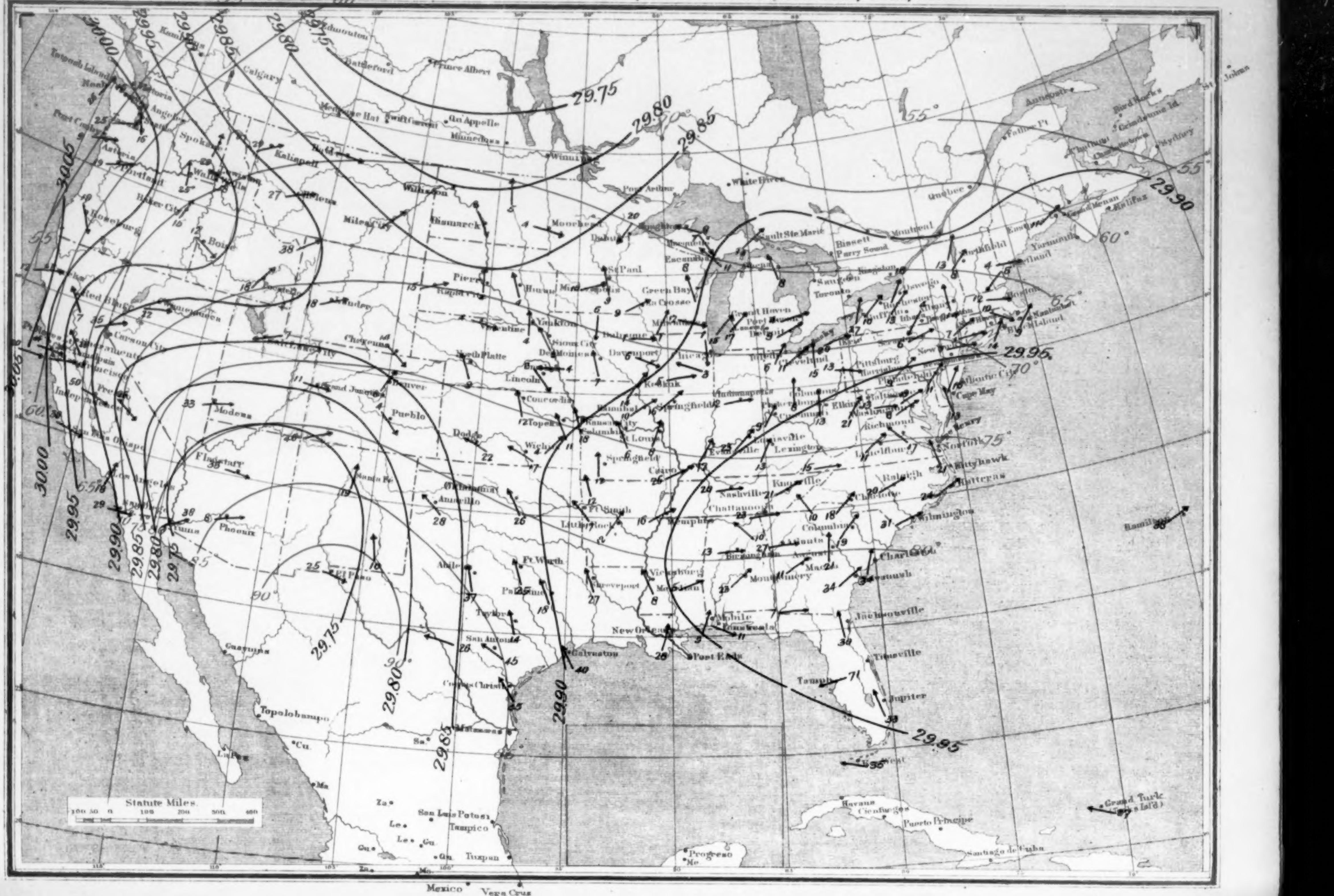
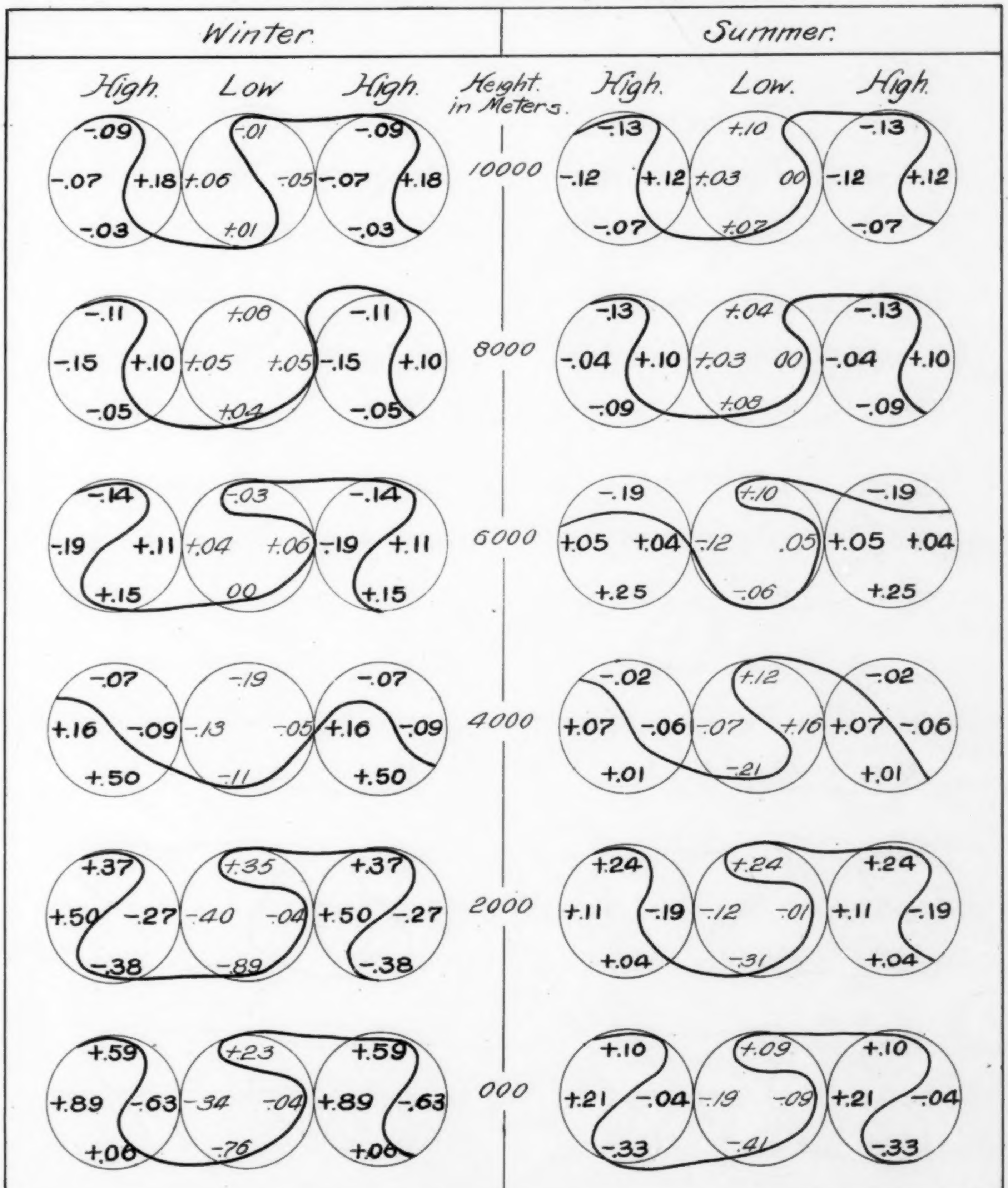


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, June, 1906.



XXXIV—80. Fig. 14.—Distribution of the values of $n - n_0$ in the high and low areas.



XXXIV—81.

Fig. 15.—Distribution of $z - z_0 = -\frac{C_p n_0}{g}(T - T_0)$.

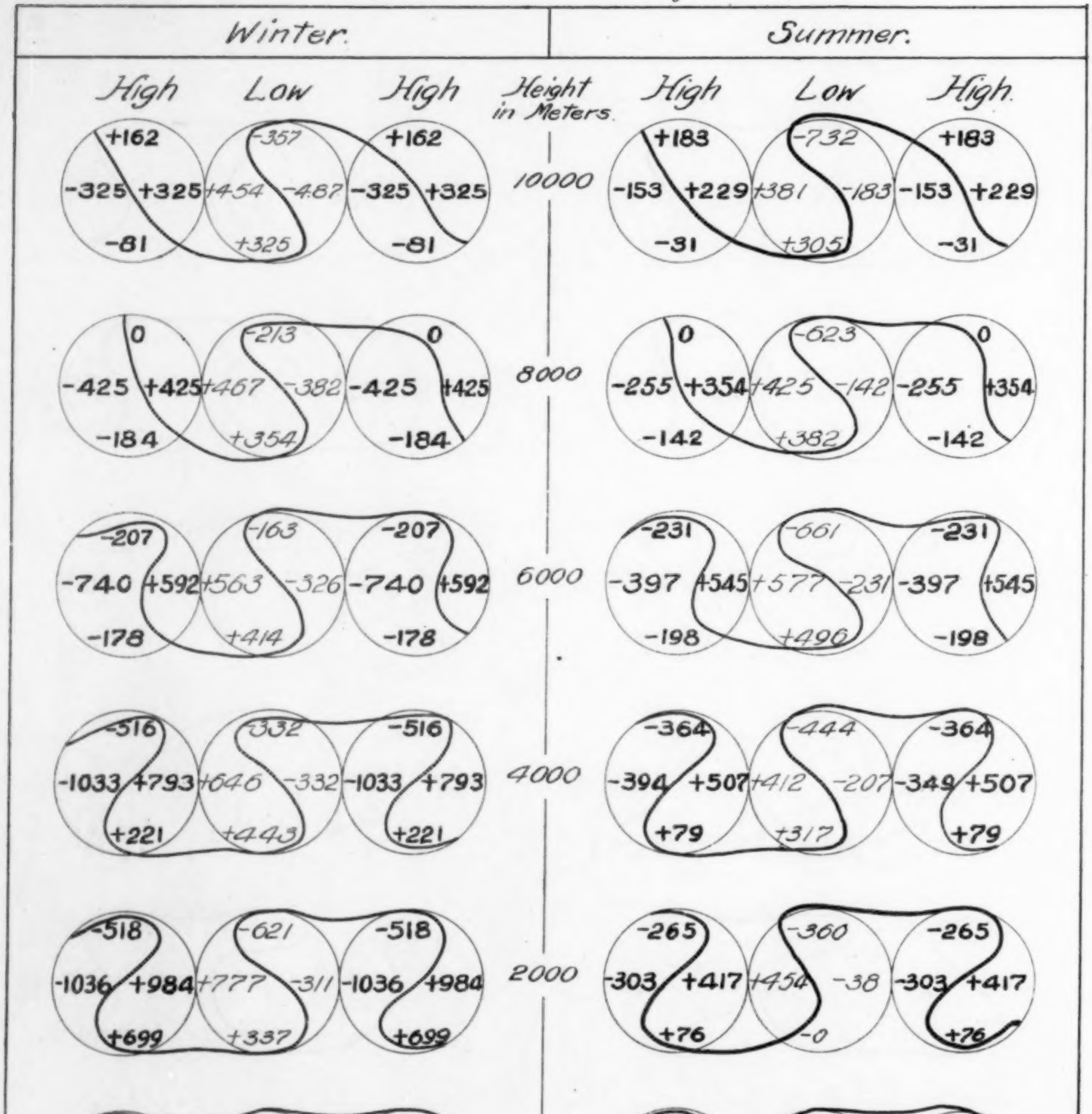


Fig. 16.—Distribution of the velocity term $\frac{1}{2}(q^2 - q_0^2)$.

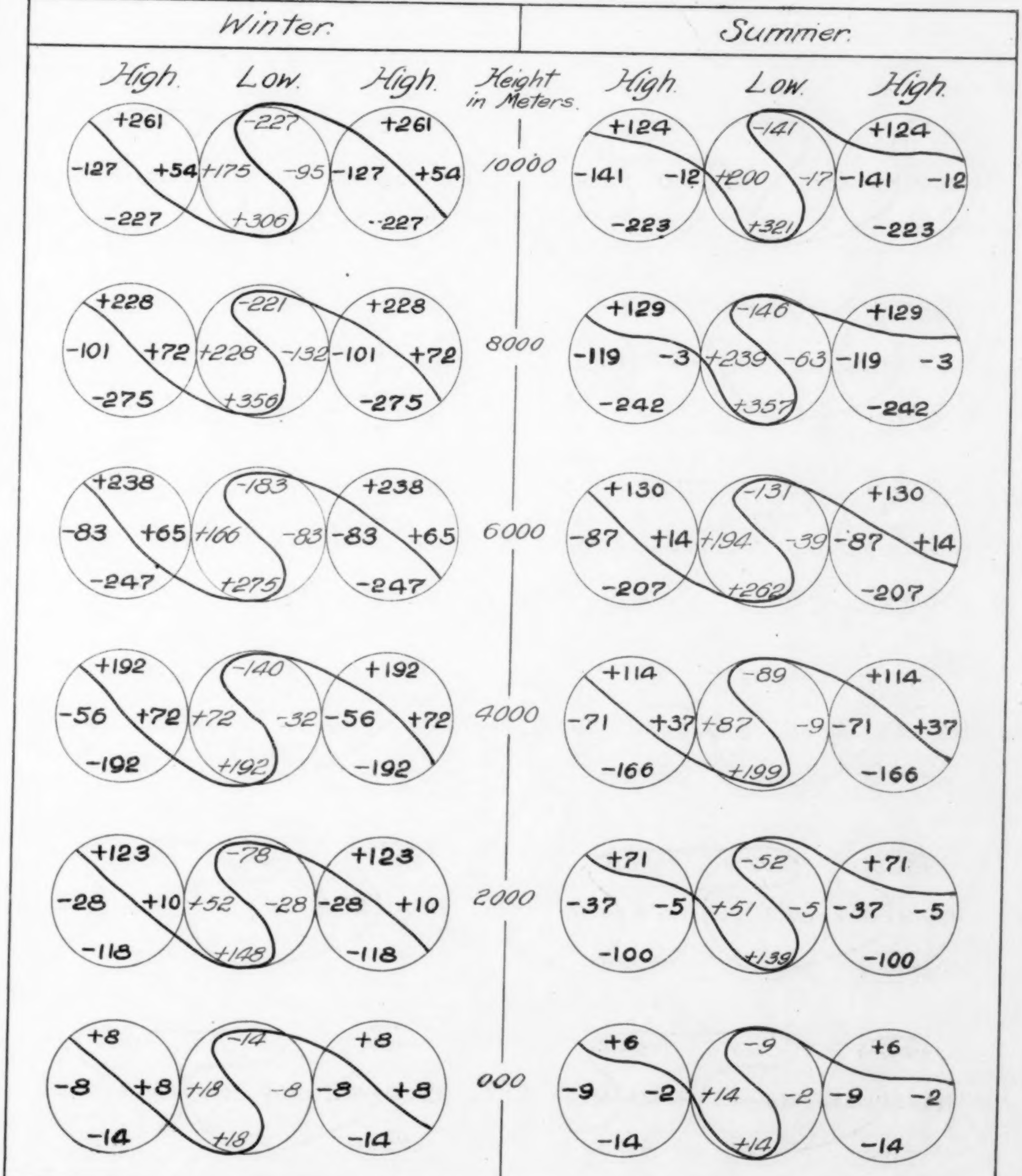


FIG. 17.—Distribution of the heat, $Q - Q_0$.

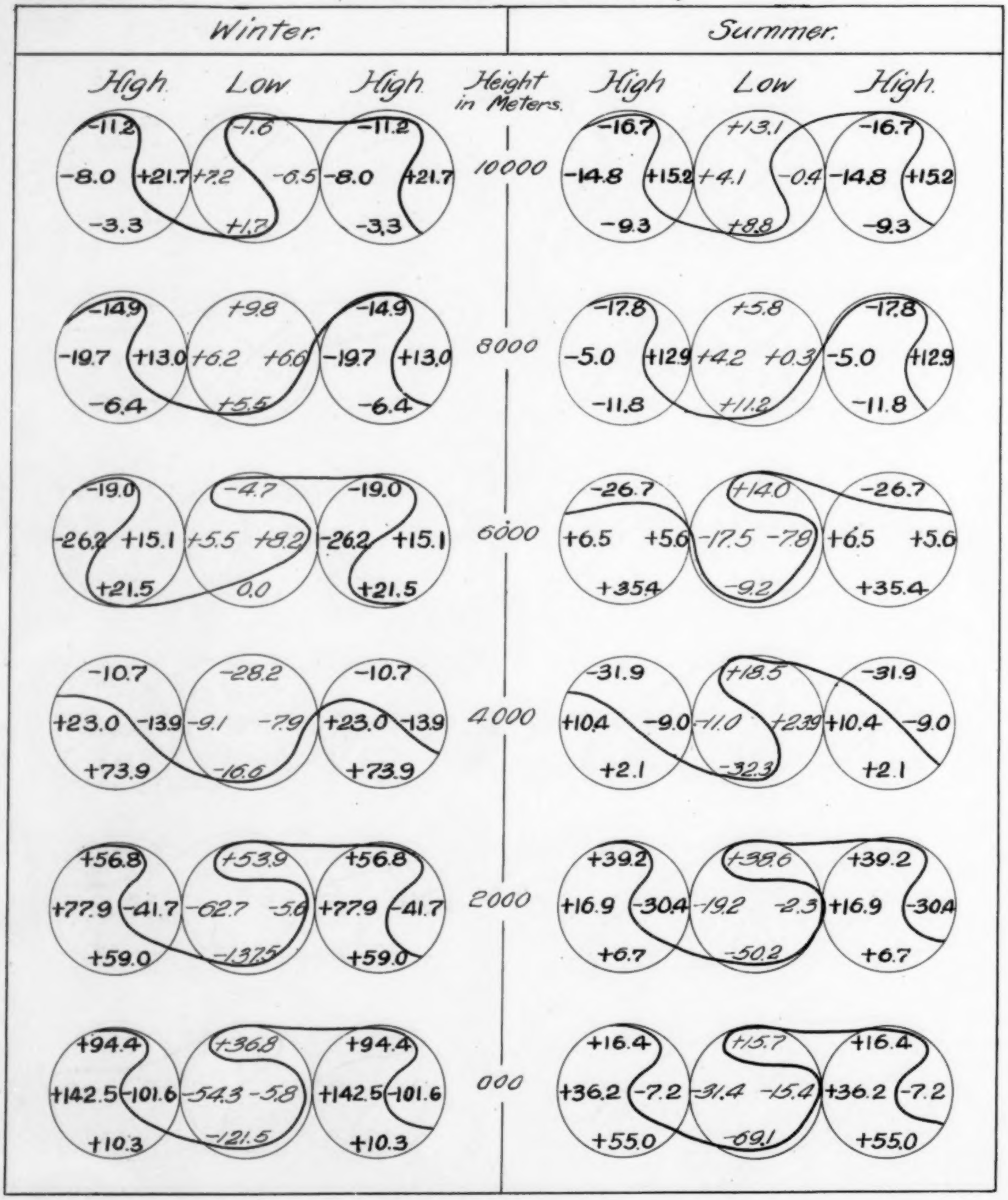


Chart I. Hydrographs for Seven Principal Rivers of the United States, July, 1906.

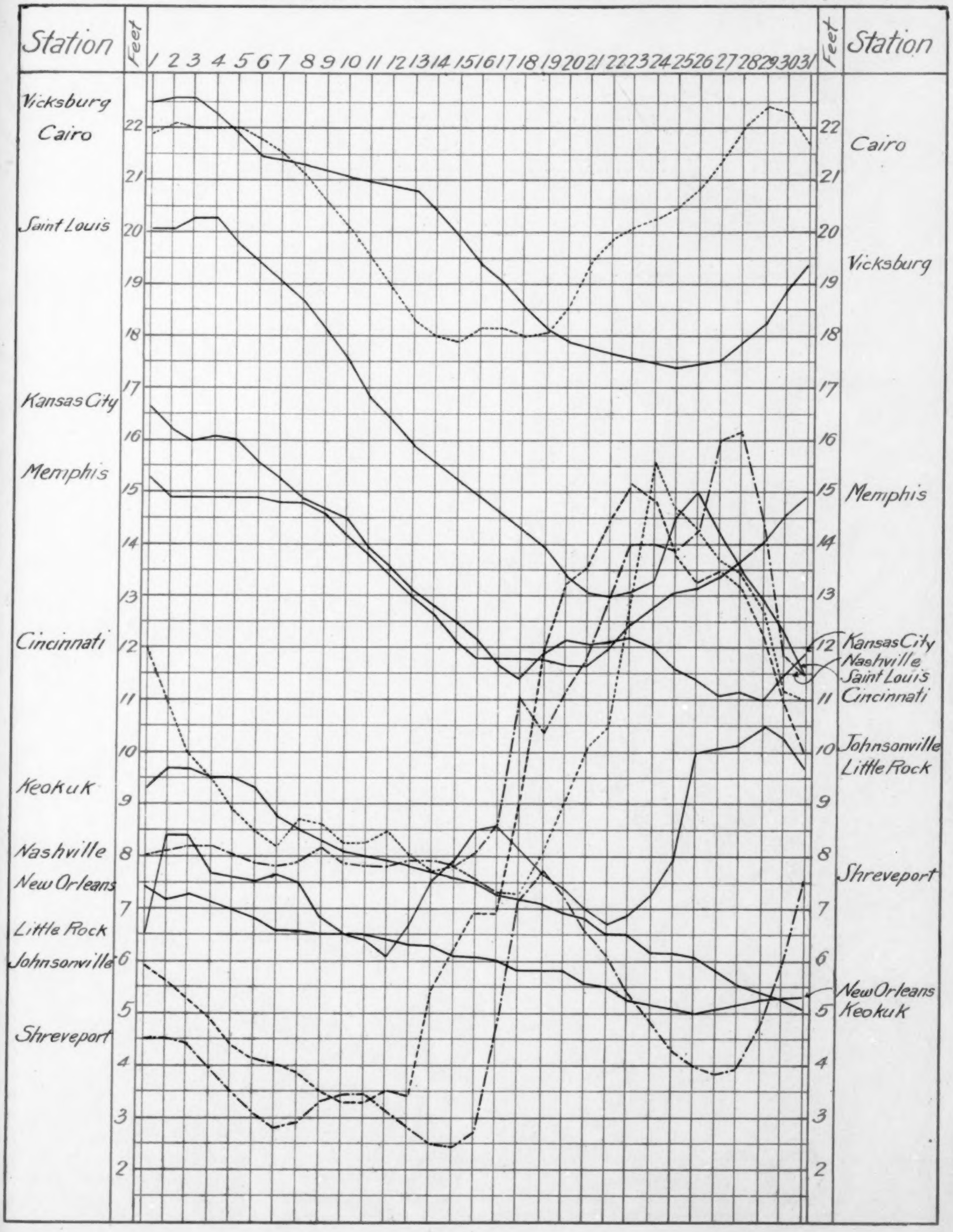


Chart II. Tracks of Centers of High Areas, July, 1906.

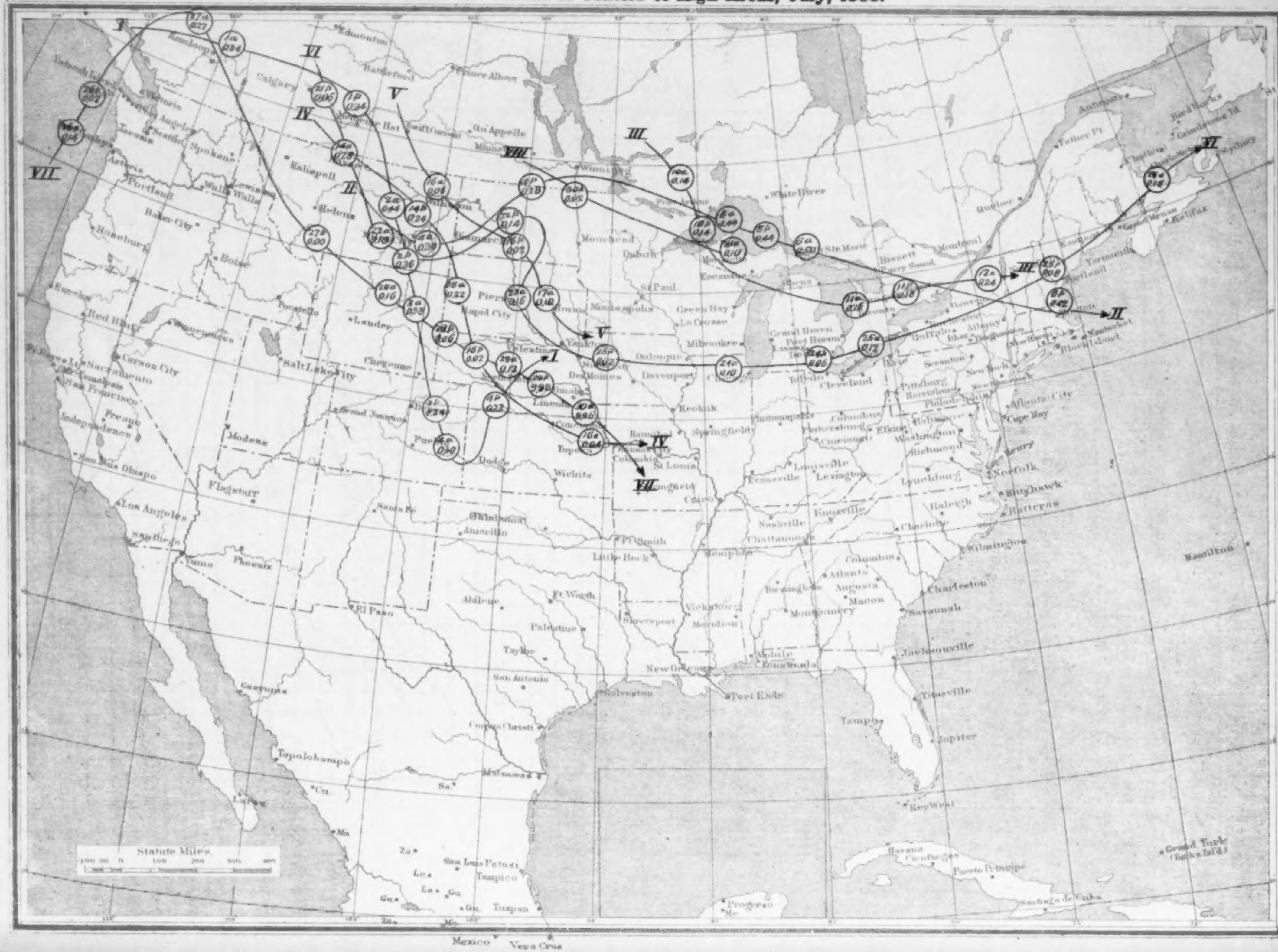


Chart III. Tracks of Centers of Low Areas, July, 1906.

Chart III. Tracks of Centers of Low Areas, July, 1906.

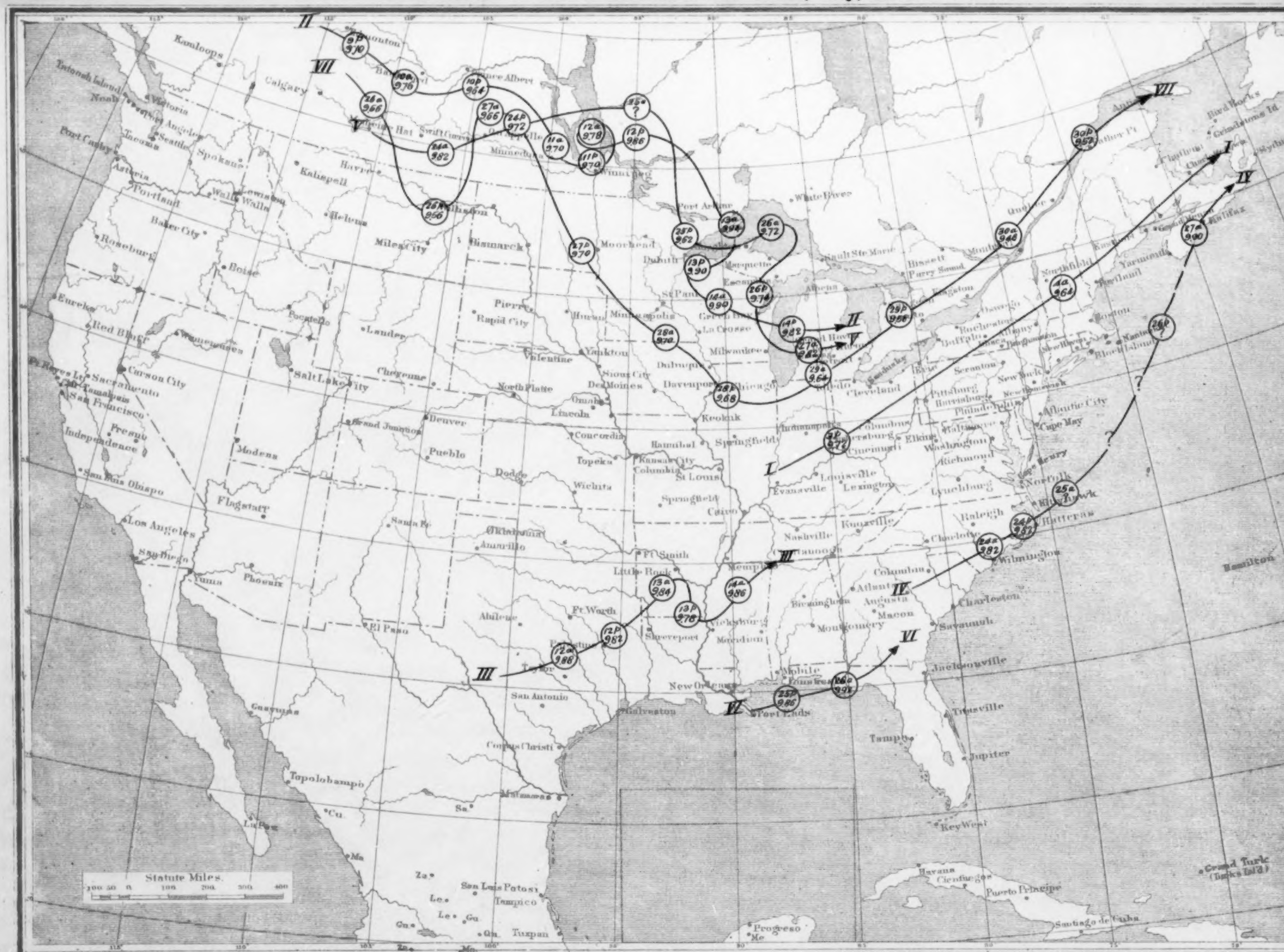


Chart IV. Total Precipitation, July, 1906.

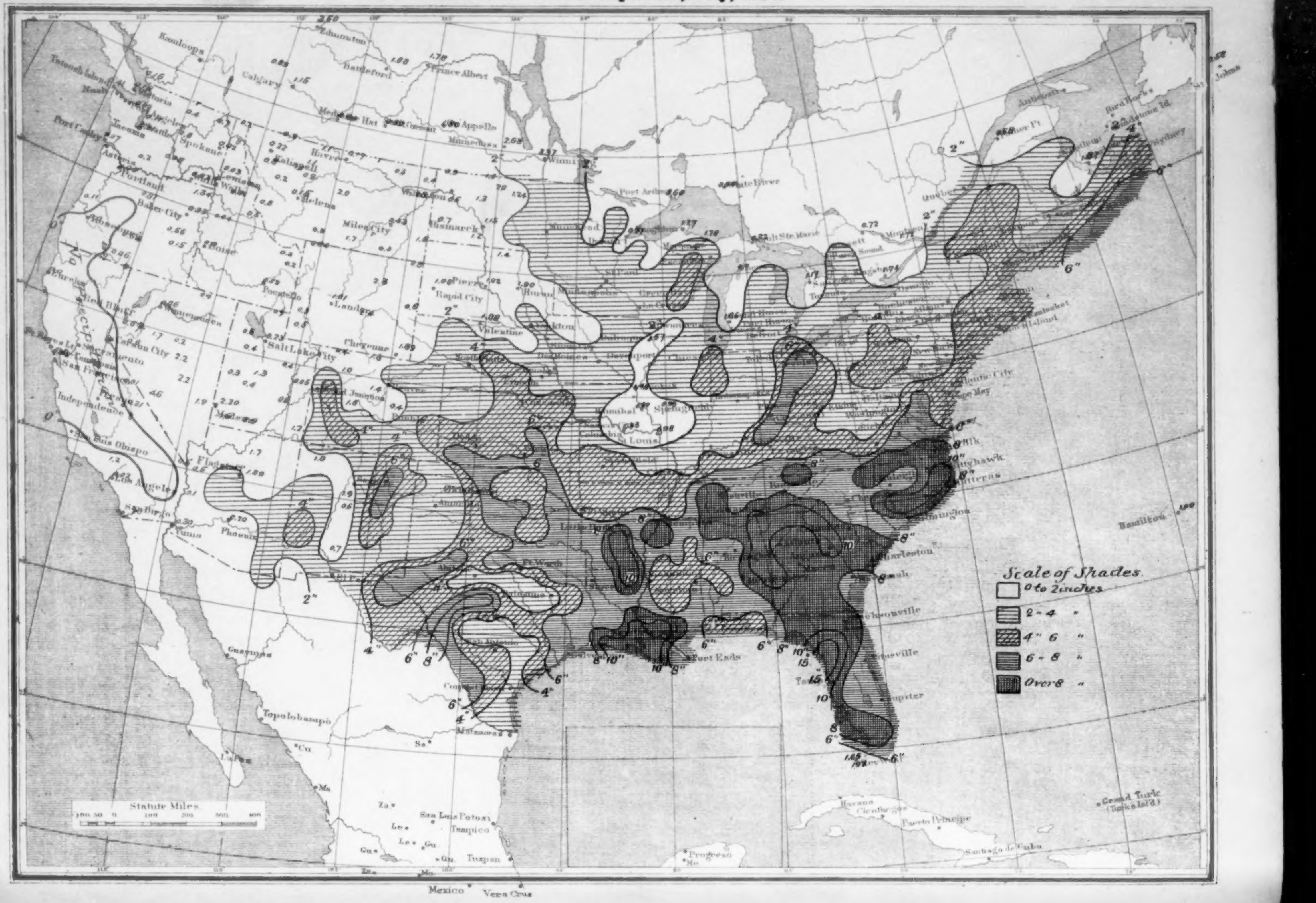


Chart V. Percentage of Clear Sky between Sunrise and Sunset, July, 1906.

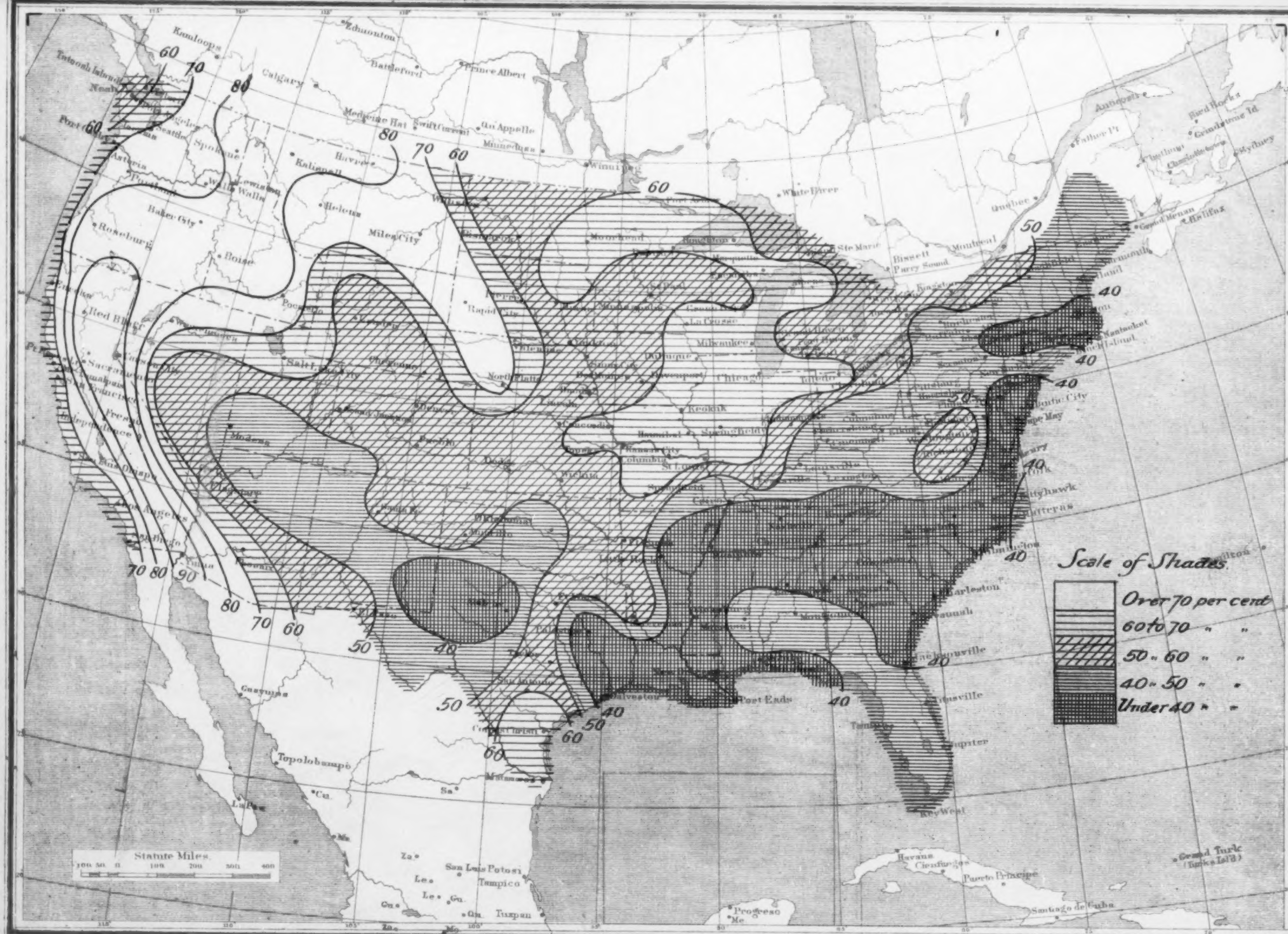
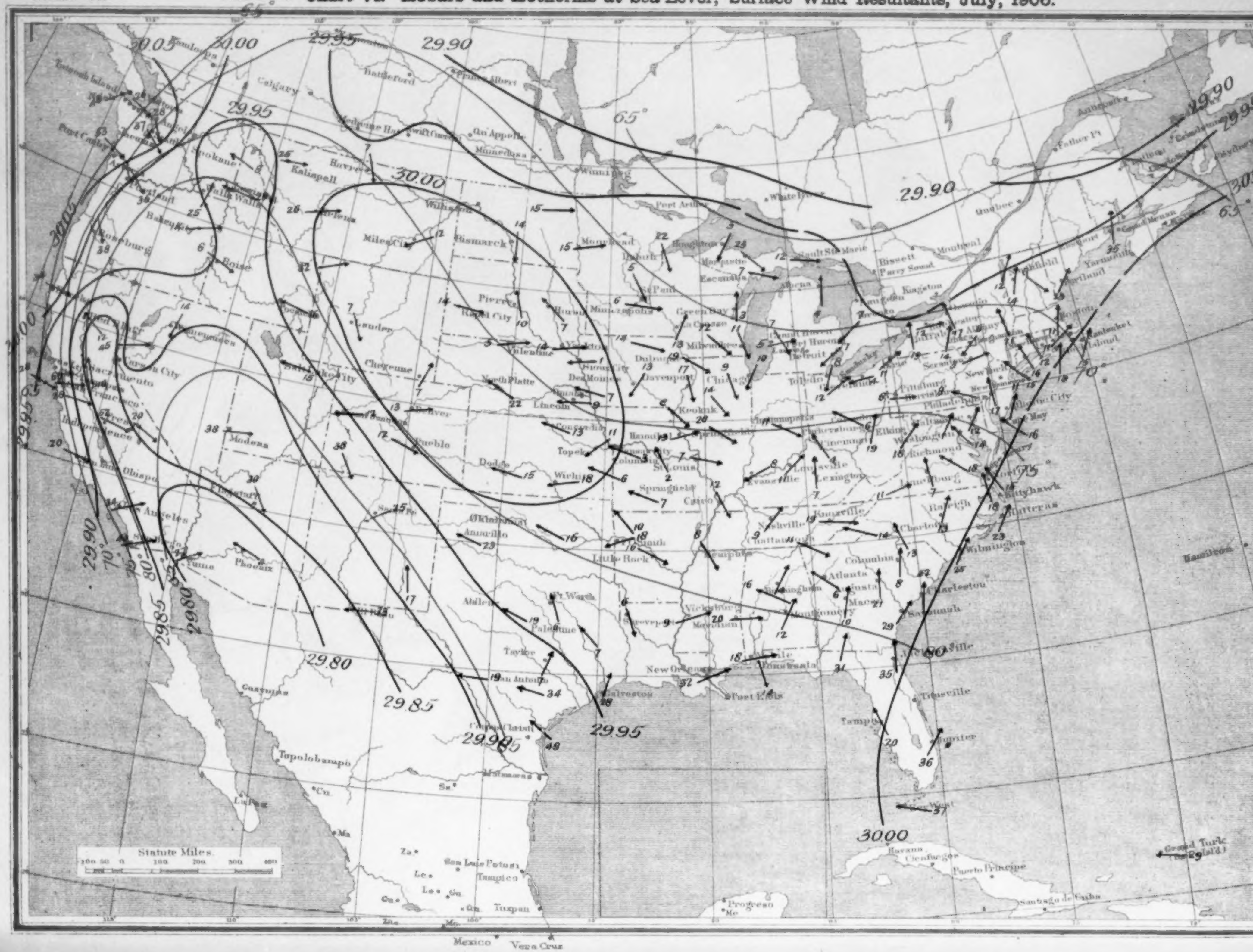


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, July, 1906.



XXXIV—91. Chart VII.—Showing the geographical distribution of the average annual rainfall on the island of Porto Rico.

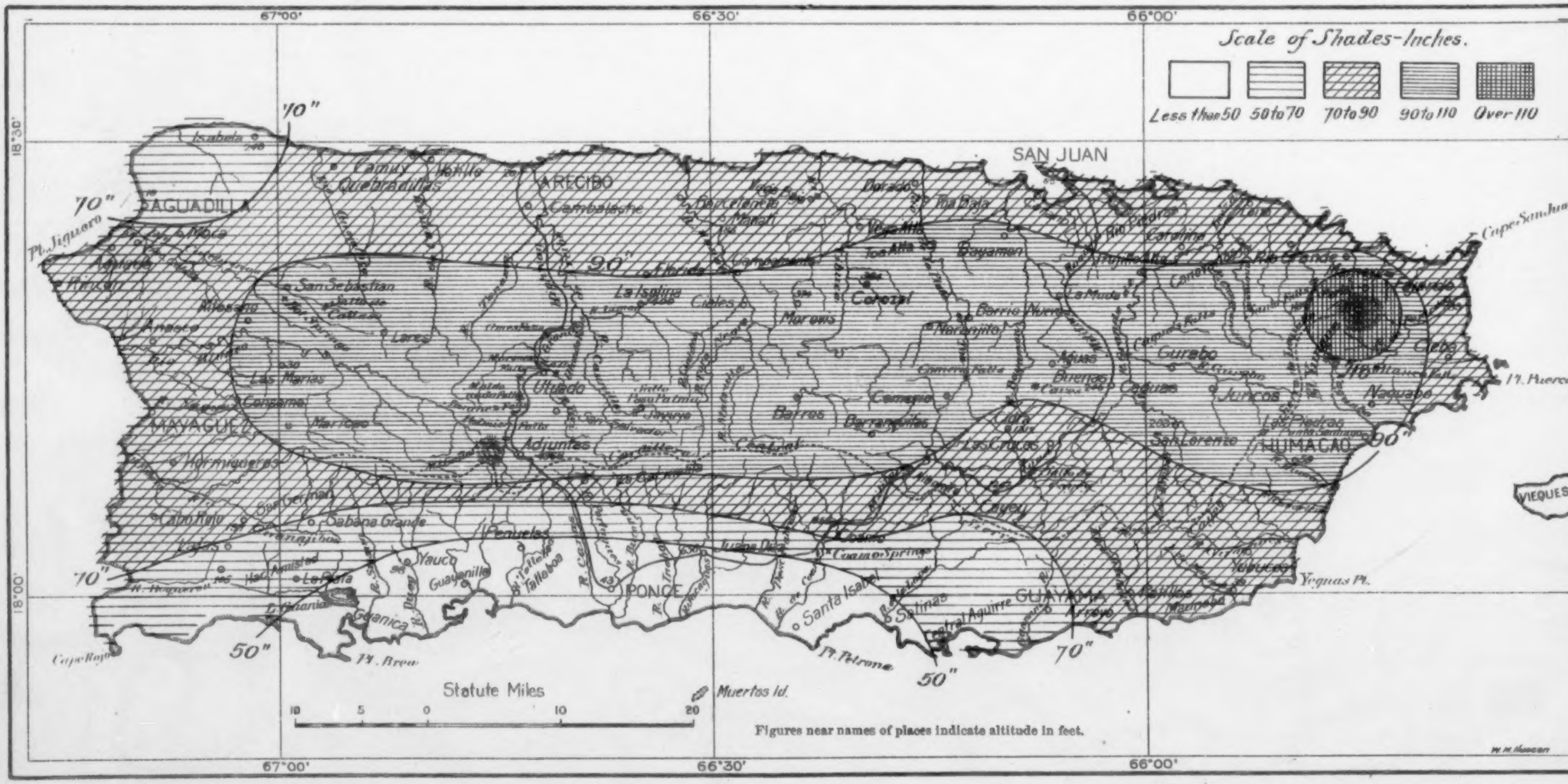


Chart VIII.—Showing the geographical distribution of the rainfall over the island of Porto Rico during the passage of the hurricane of August 8, 1899.

FIG. 27.—2d A; second appearance; Chamberlain; Cottage City; 1:02 p. m.

Fig. 28.—2d B; second appearance; Coolidge; Cottage City; 1.03 p. m.

Fig. 29.—2d C; second appearance; Hallet; Cottage City; 1:08 p. m.

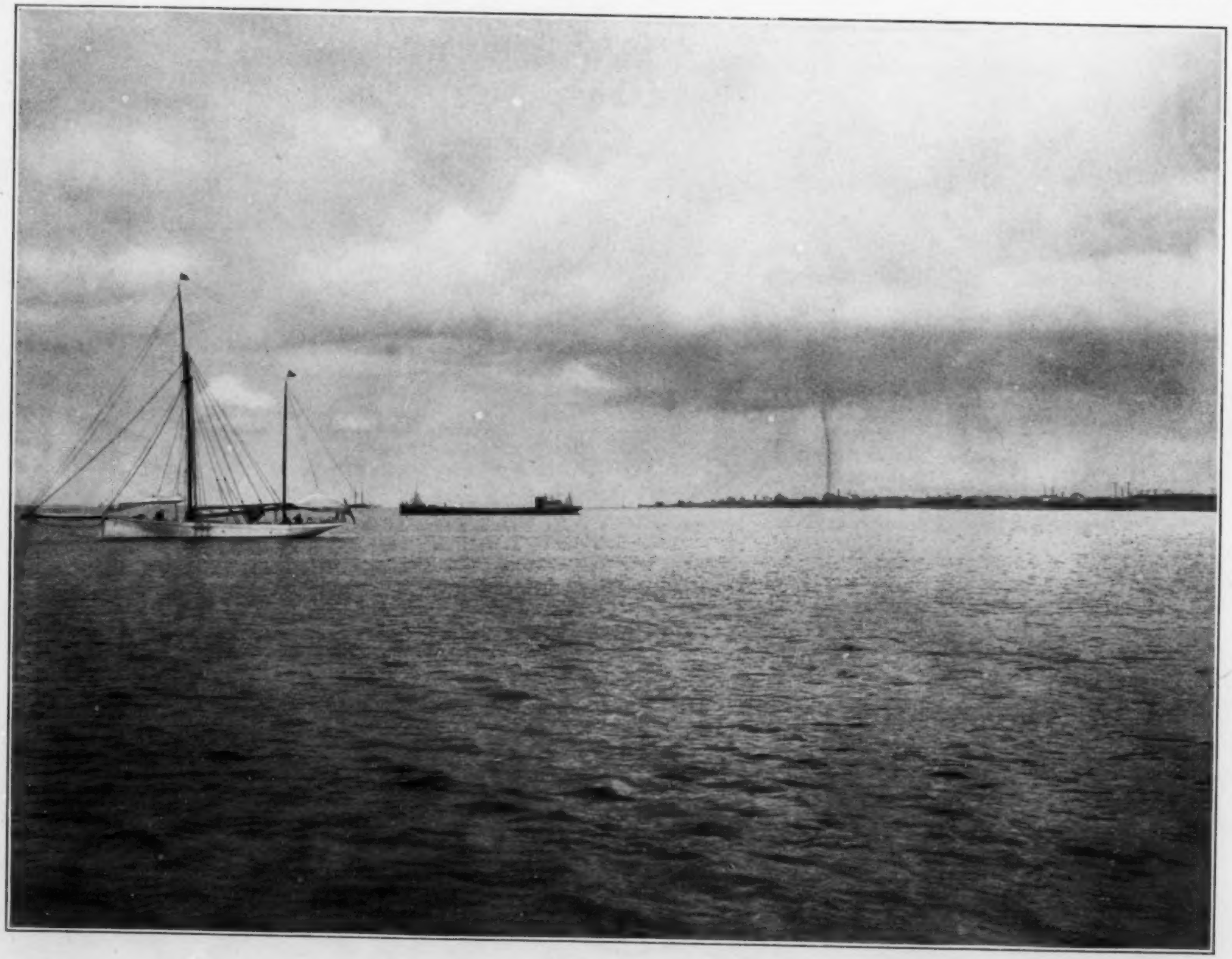


FIG. 30.—2d D; second appearance; Dodge; Vineyard Haven; 1:12 p. m.

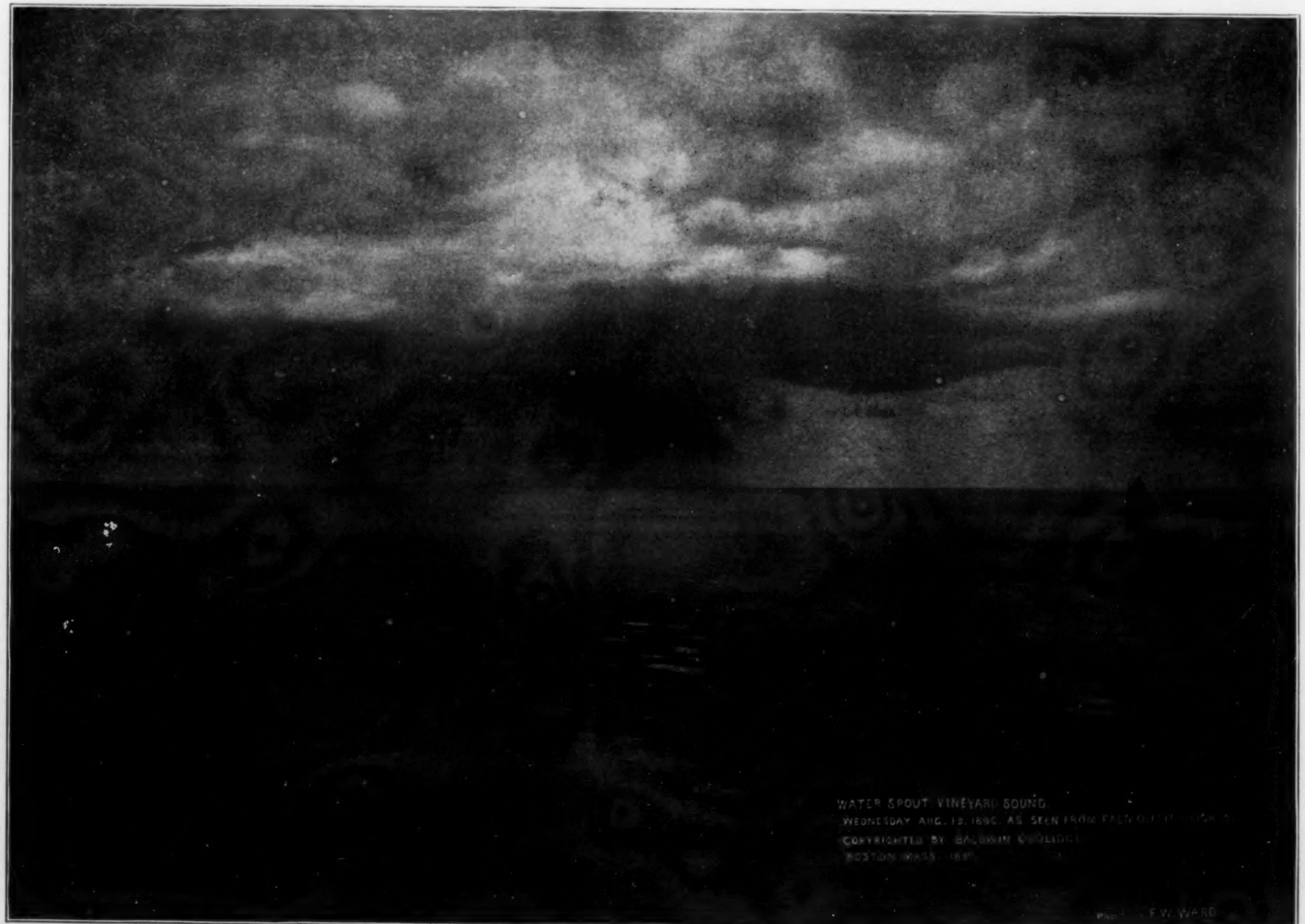


FIG. 31.—2d E; second appearance; Ward; Falmouth Heights; 1:14 p. m.

FIG. 32.—2d F; second appearance; Coolidge; Cottage City; 1:15 p. m.

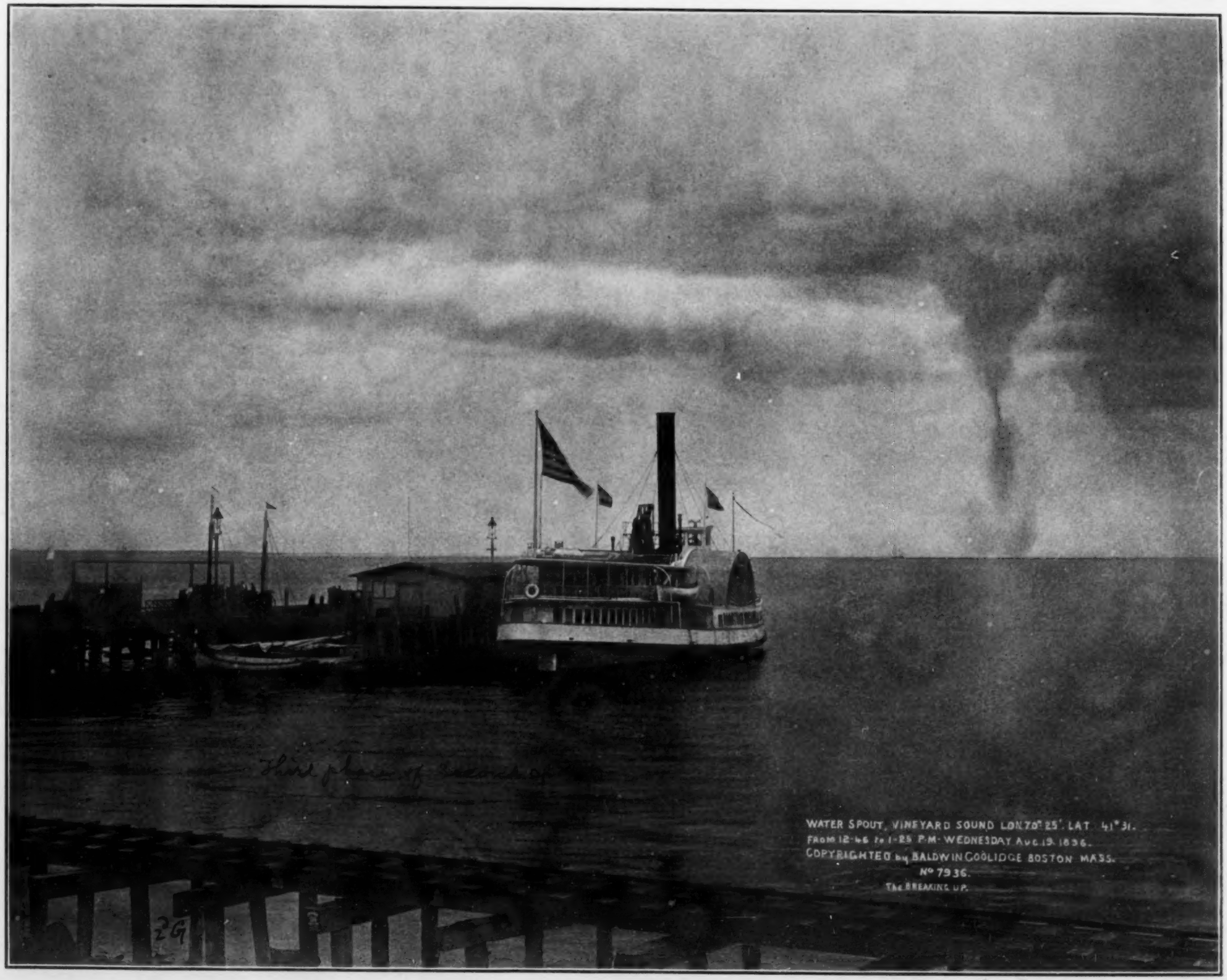


FIG. 33.—2d G; second appearance; Coolidge; Cottage City; 1:17 p. m.

FIG. 34.—3d A; third appearance; Chamberlain; Cottage City; 1:20 p. m.

Fig. 35.—3d B; third appearance; Chamberlain; Cottage City; 1:24 p. m.

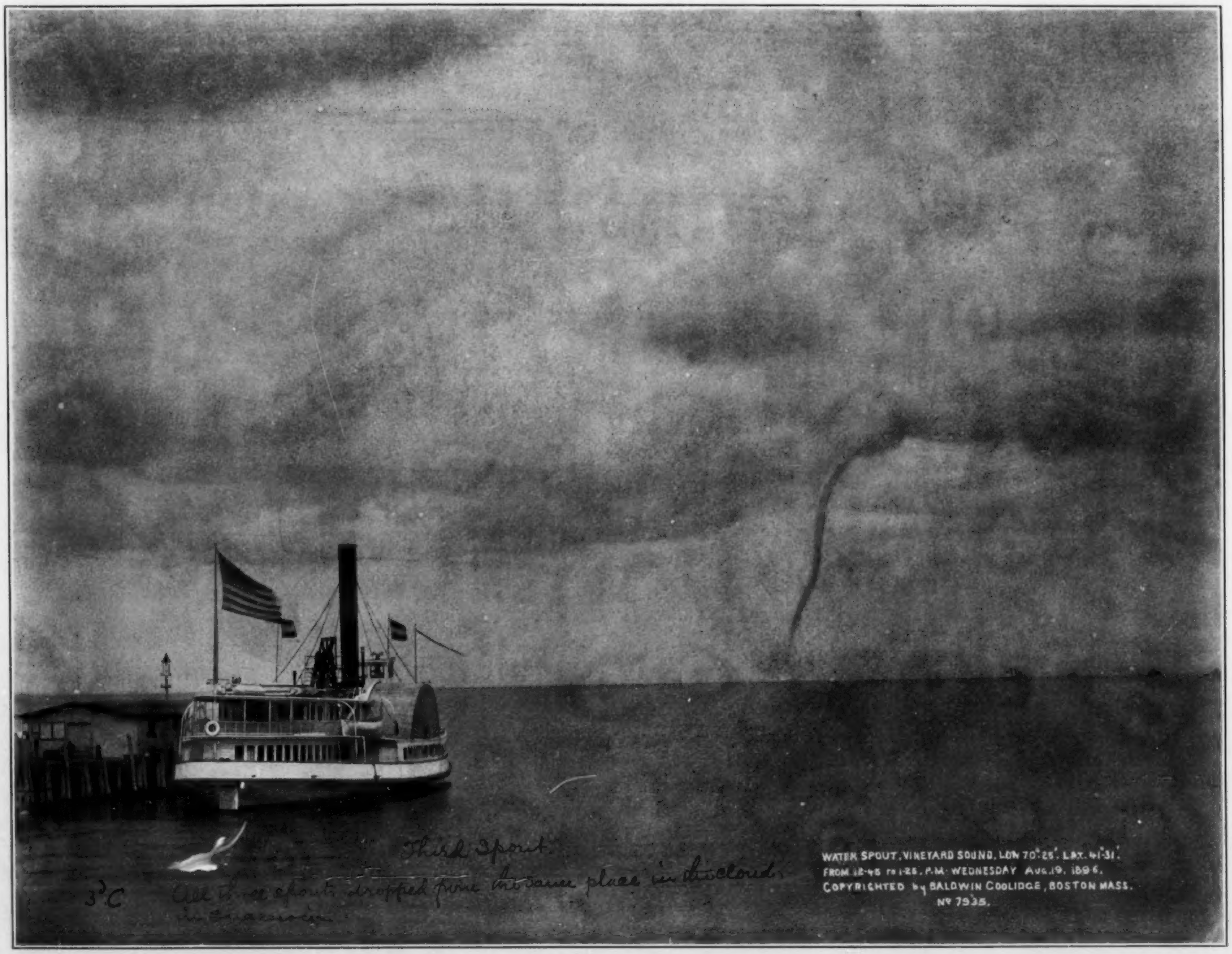


FIG. 36.—3d C; third appearance; Coolidge; Cottage City; 1:27 p. m.

Chart I. Hydrographs for Seven Principal Rivers of the United States, August, 1906.

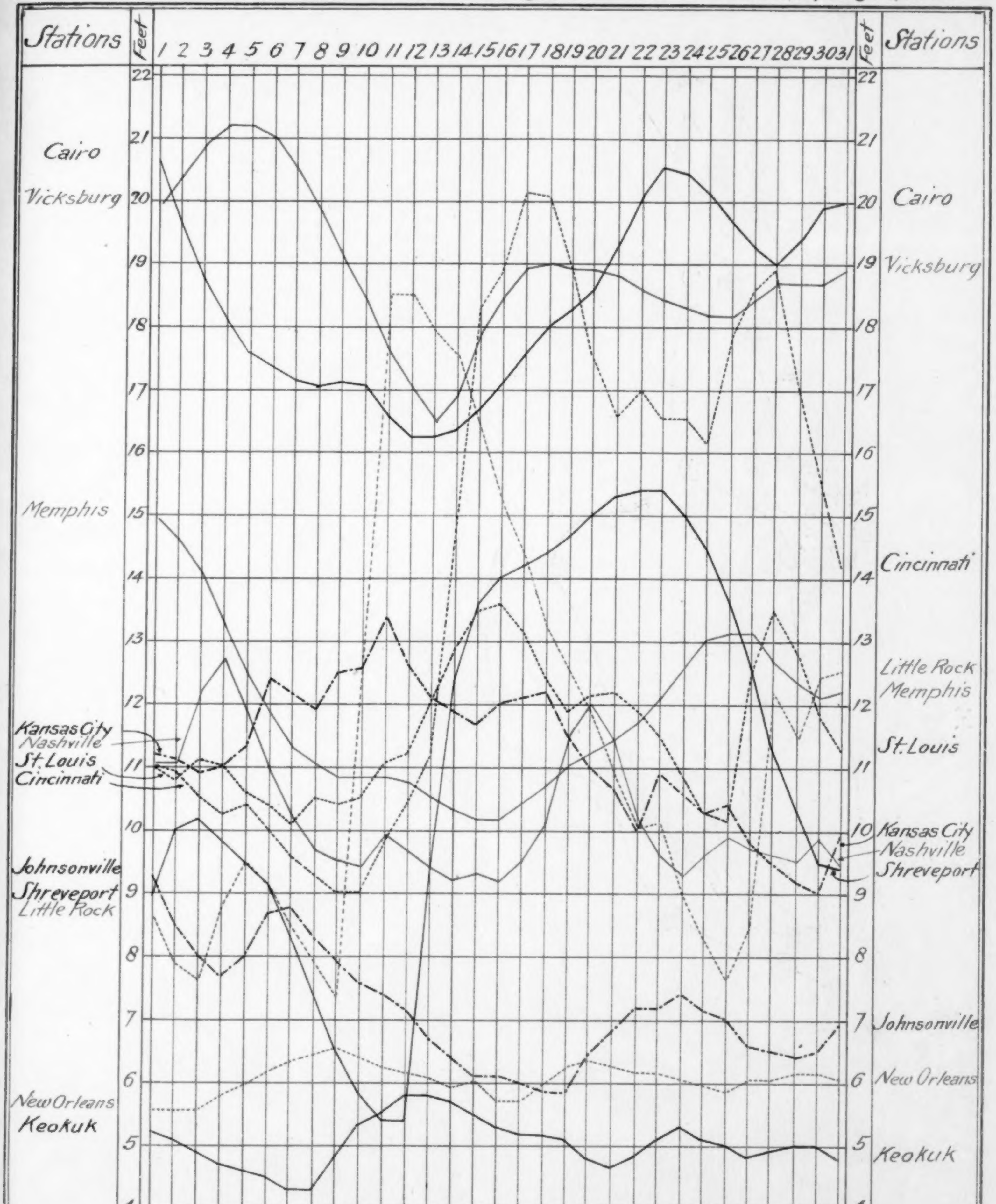


Chart II. Tracks of Centers of High Areas, August, 1906.

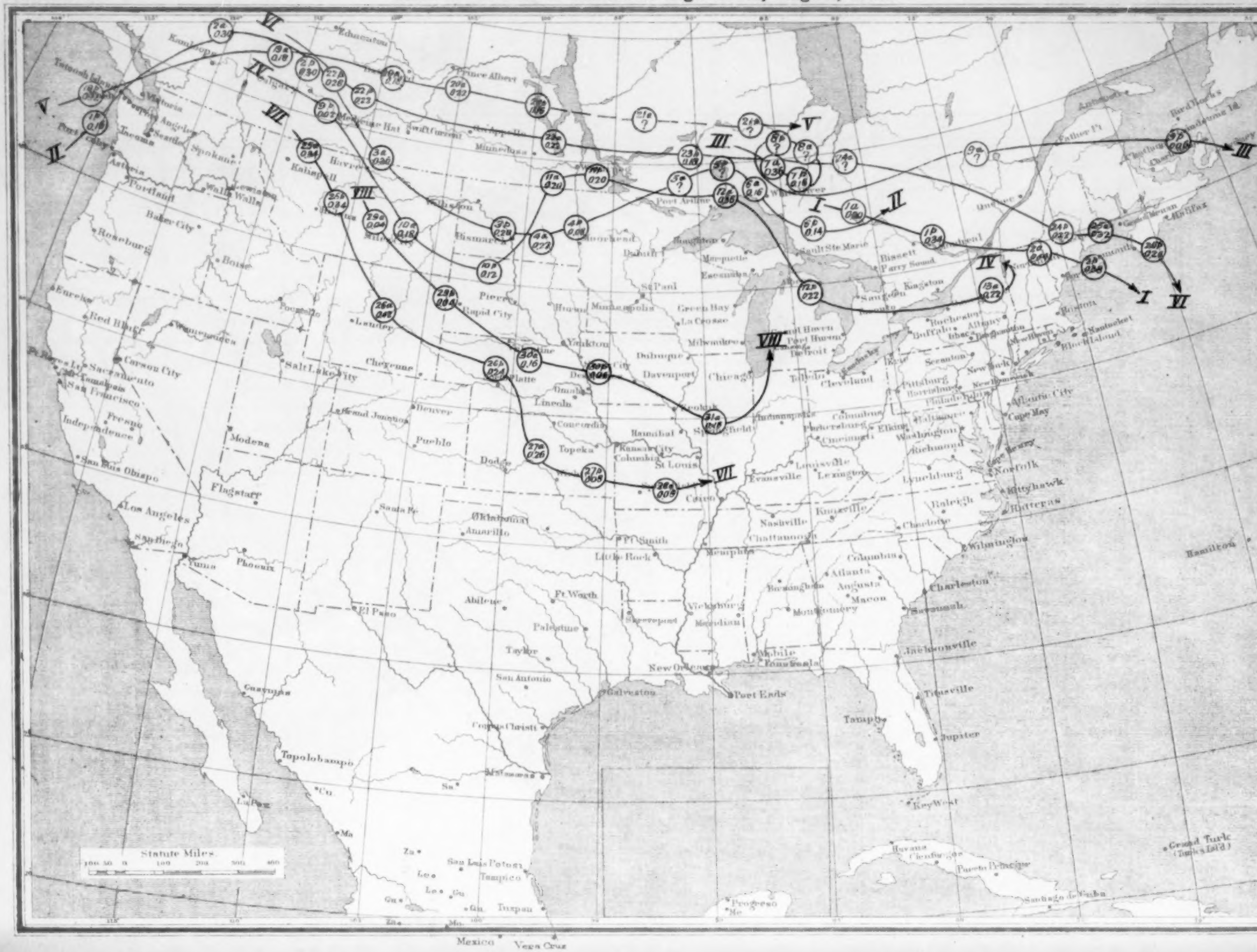


Chart III. Tracks of Centers of Low Areas, August, 1906.

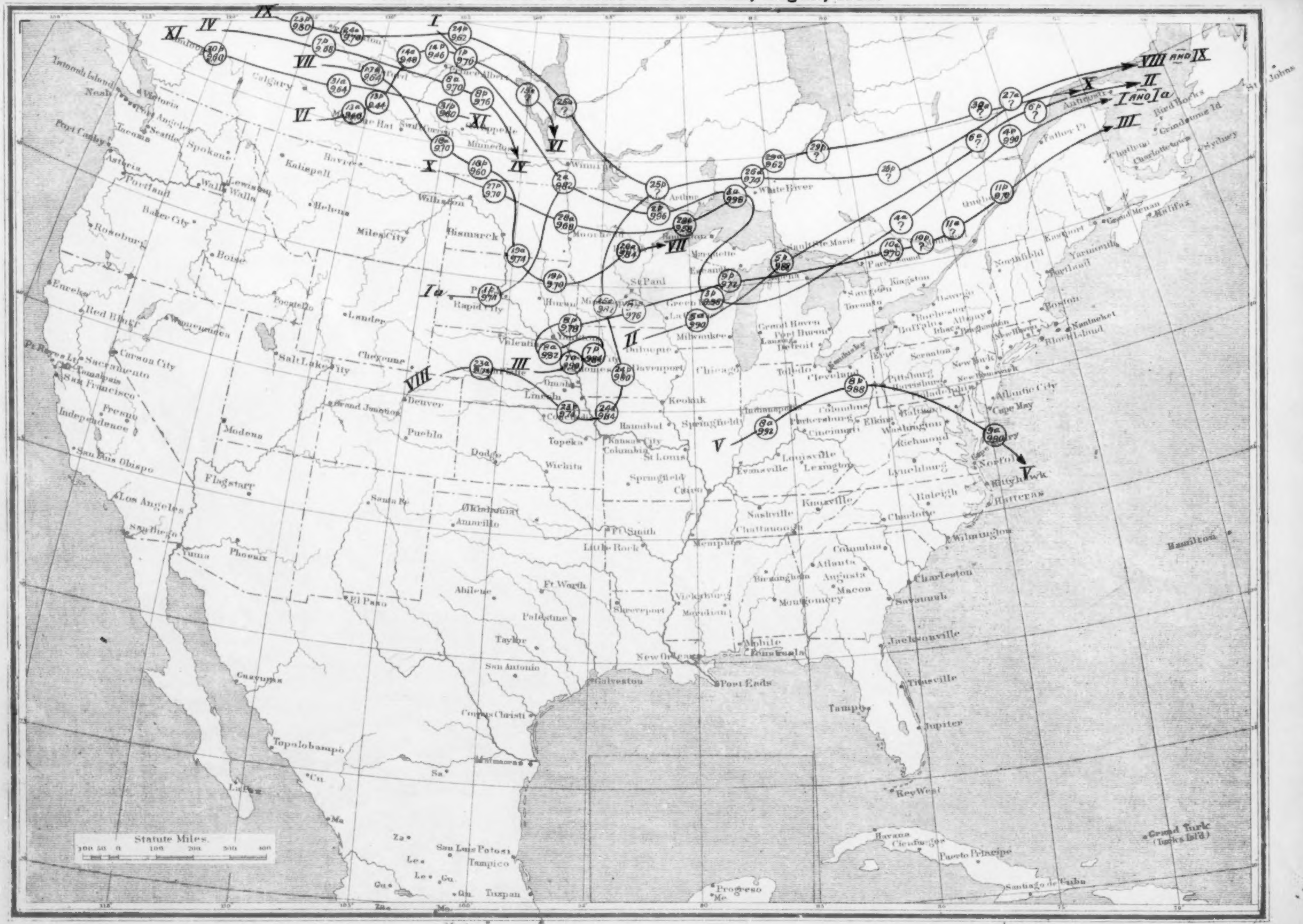


Chart IV. Total Precipitation, August, 1906.

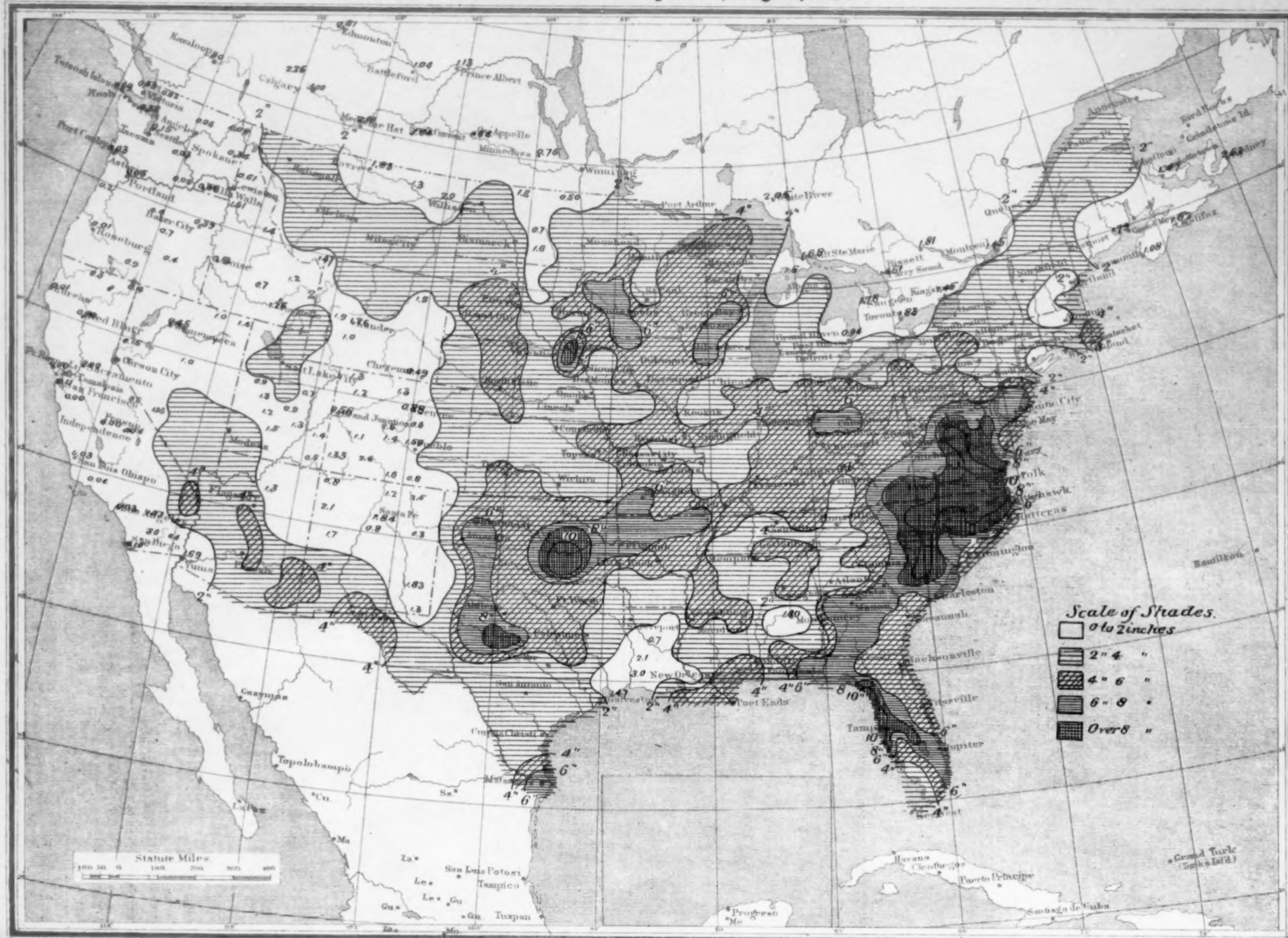


Chart V. Percentage of Clear Sky between Sunrise and Sunset, August, 1906.

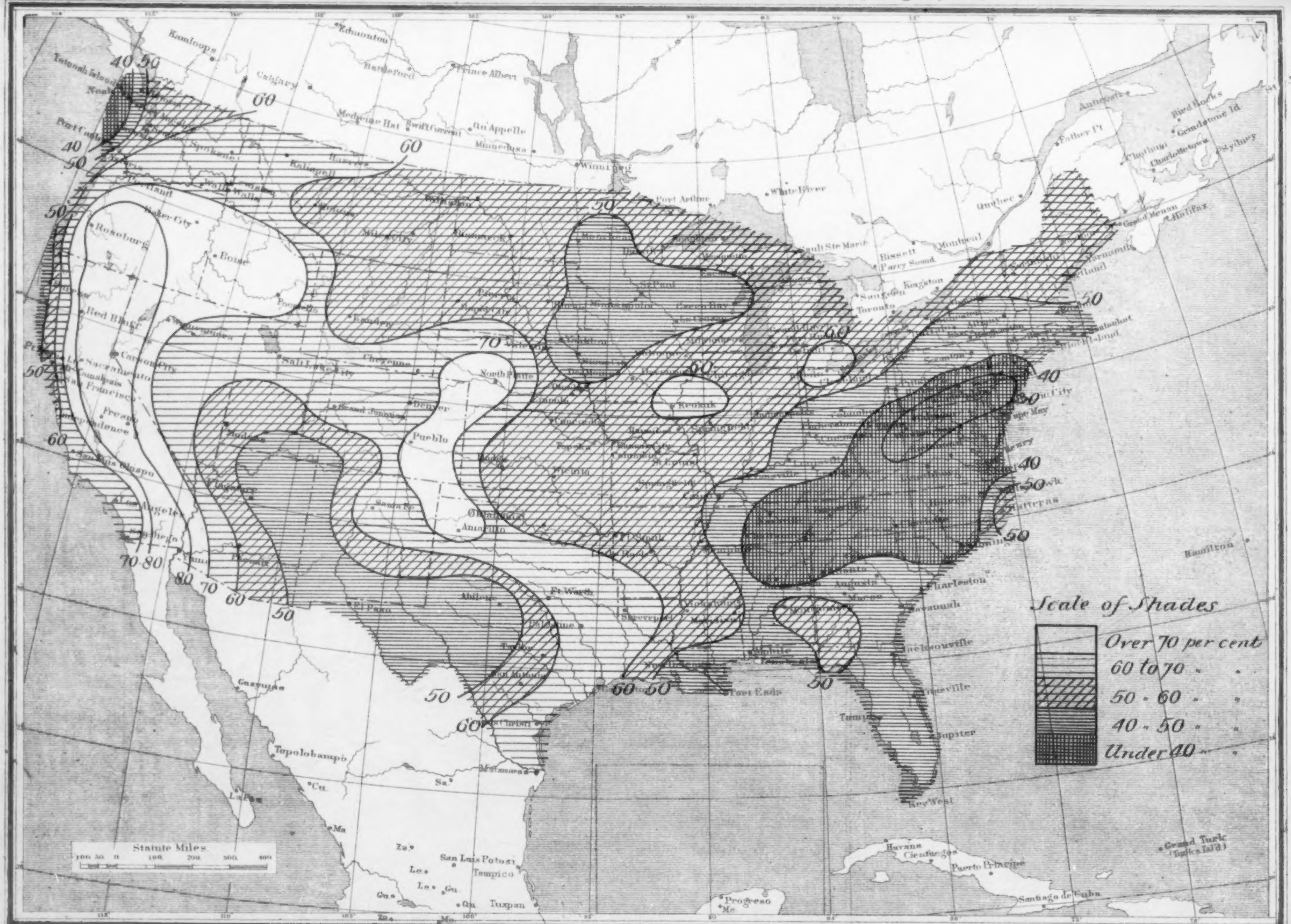


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, August, 1906.

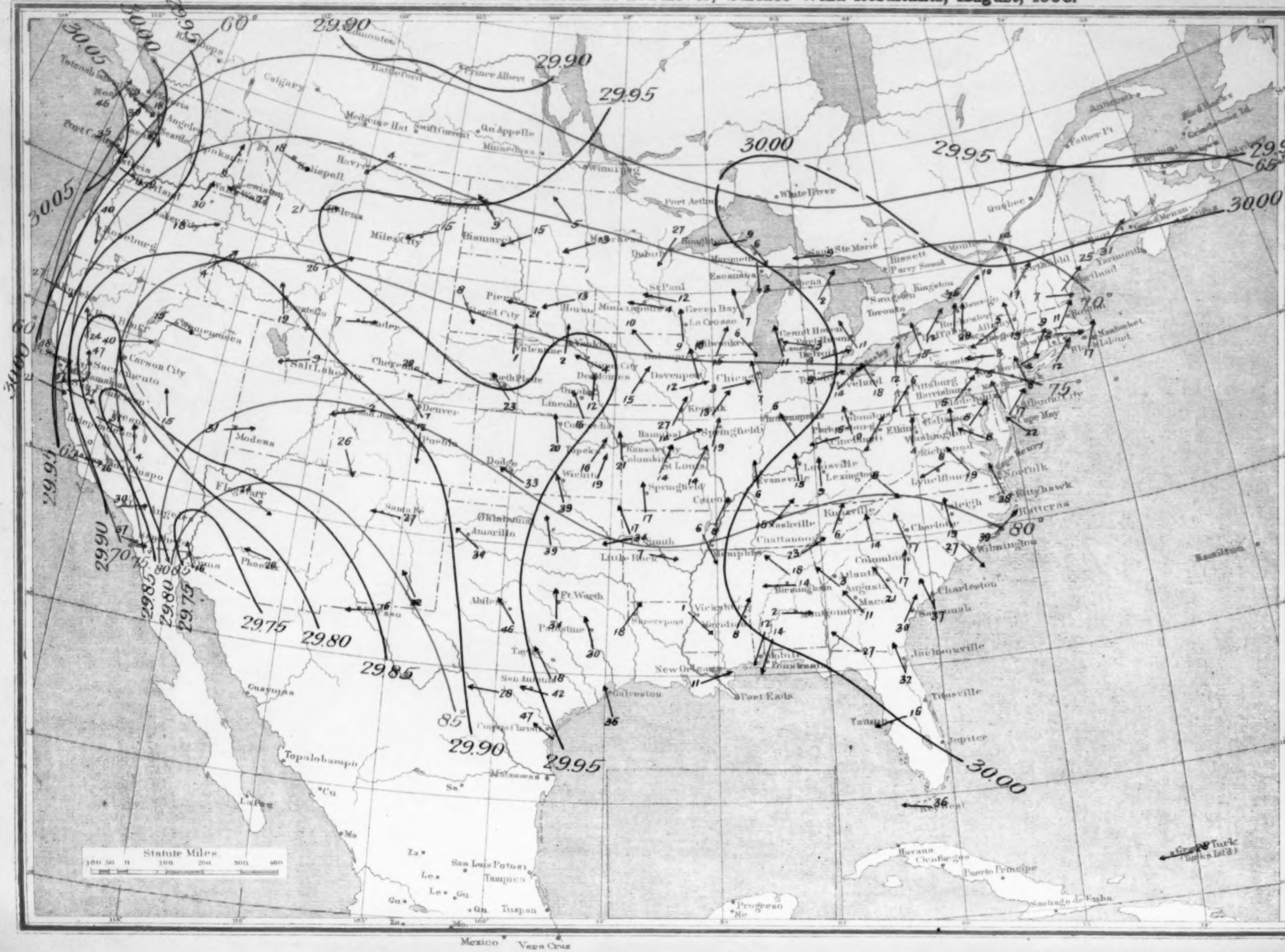


Chart I. Hydrographs for Seven Principal Rivers of the United States, September, 1906.

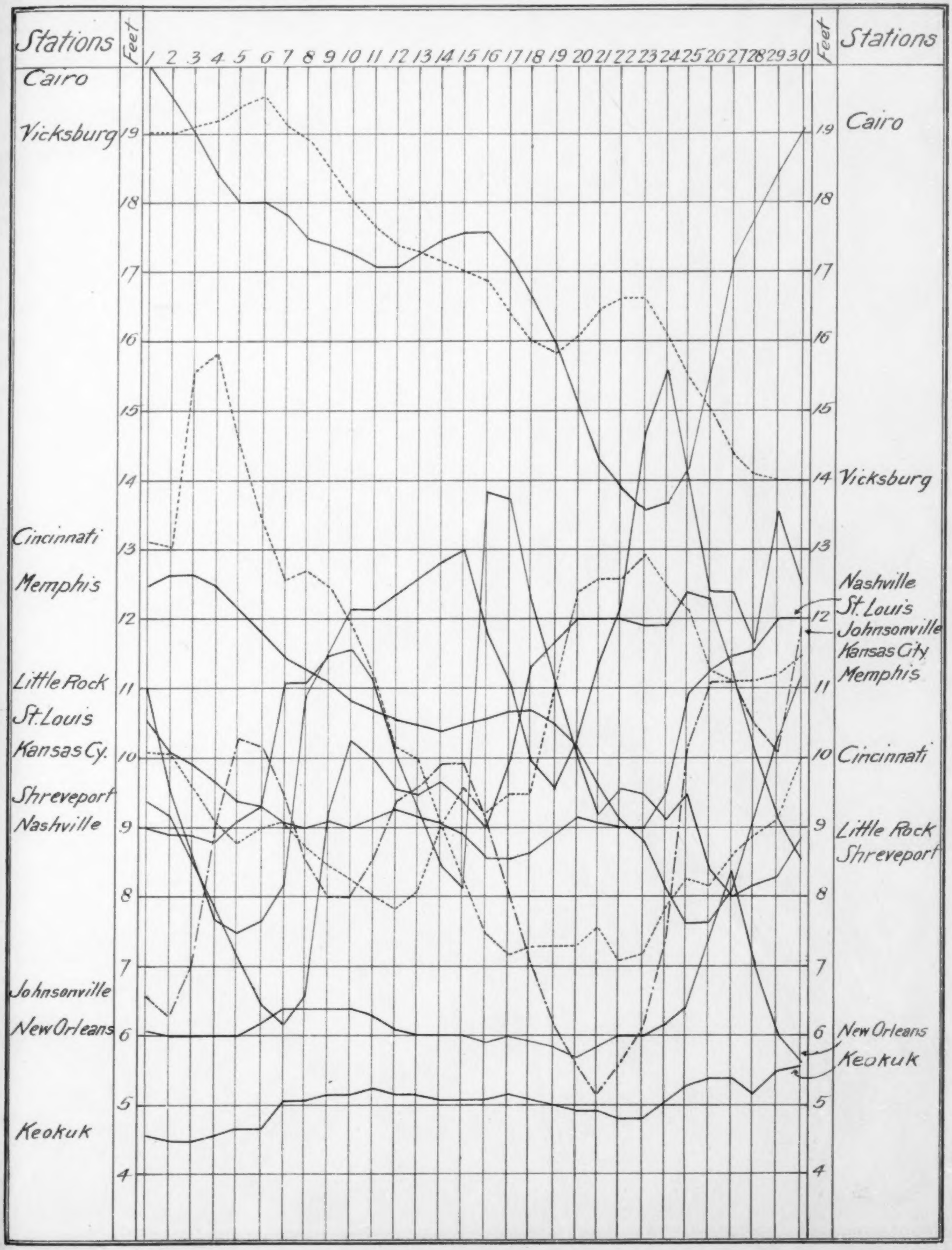
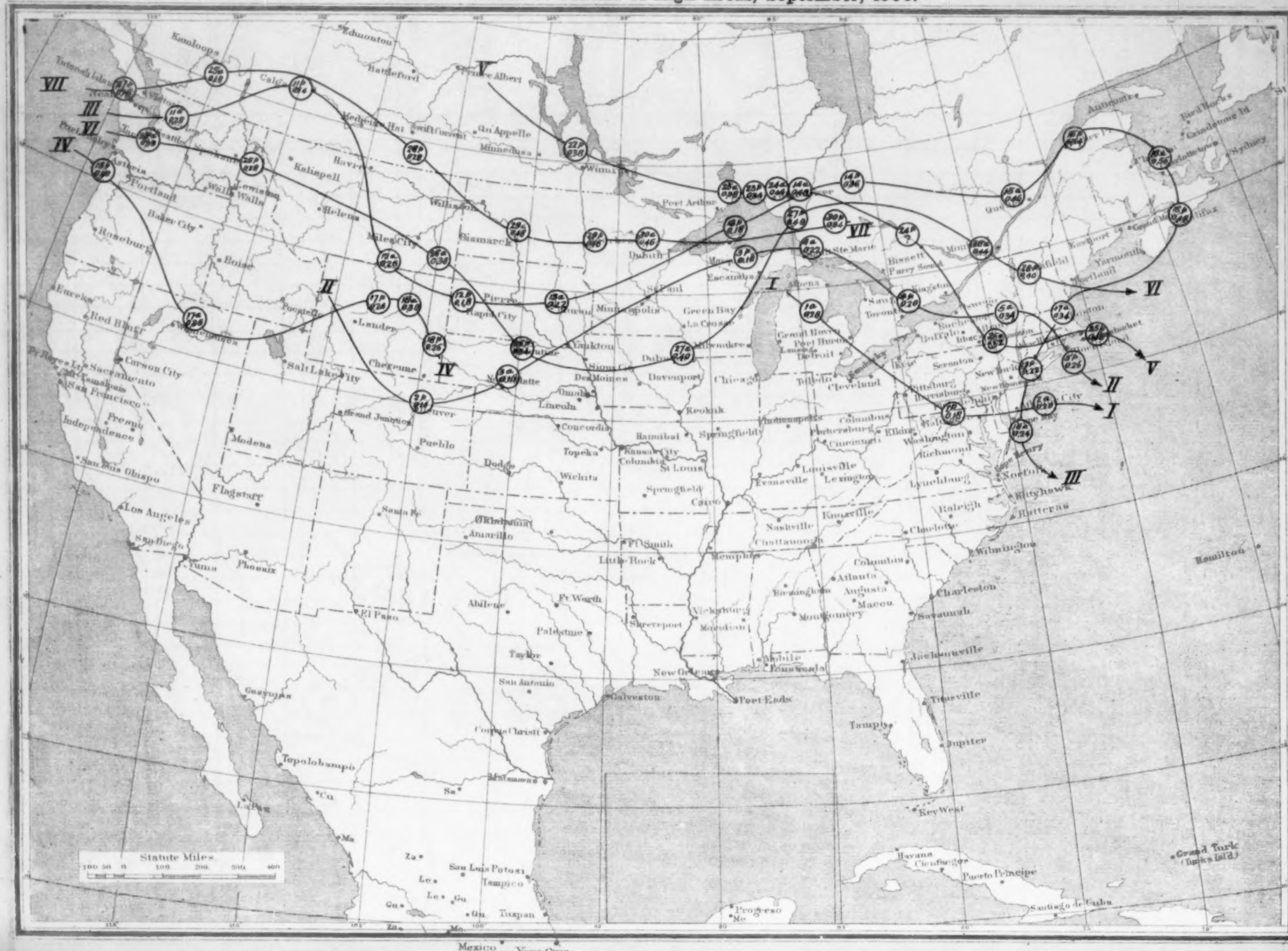


Chart II. Tracks of Centers of High Areas, September, 1906.



XXXIV—111.

Chart III. Tracks of Centers of Low Areas, September, 1906.

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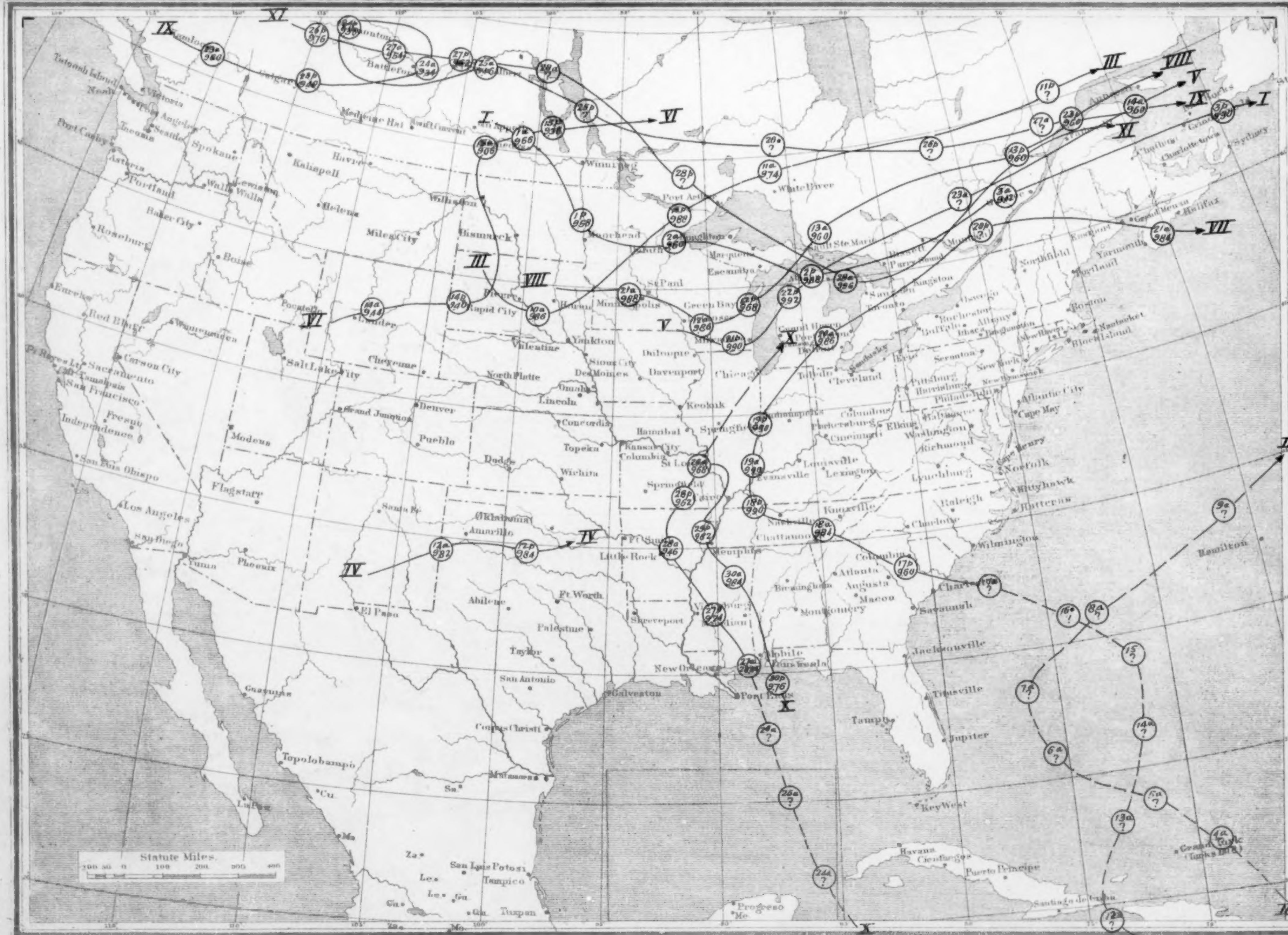


Chart IV. Total Precipitation, September, 1906.

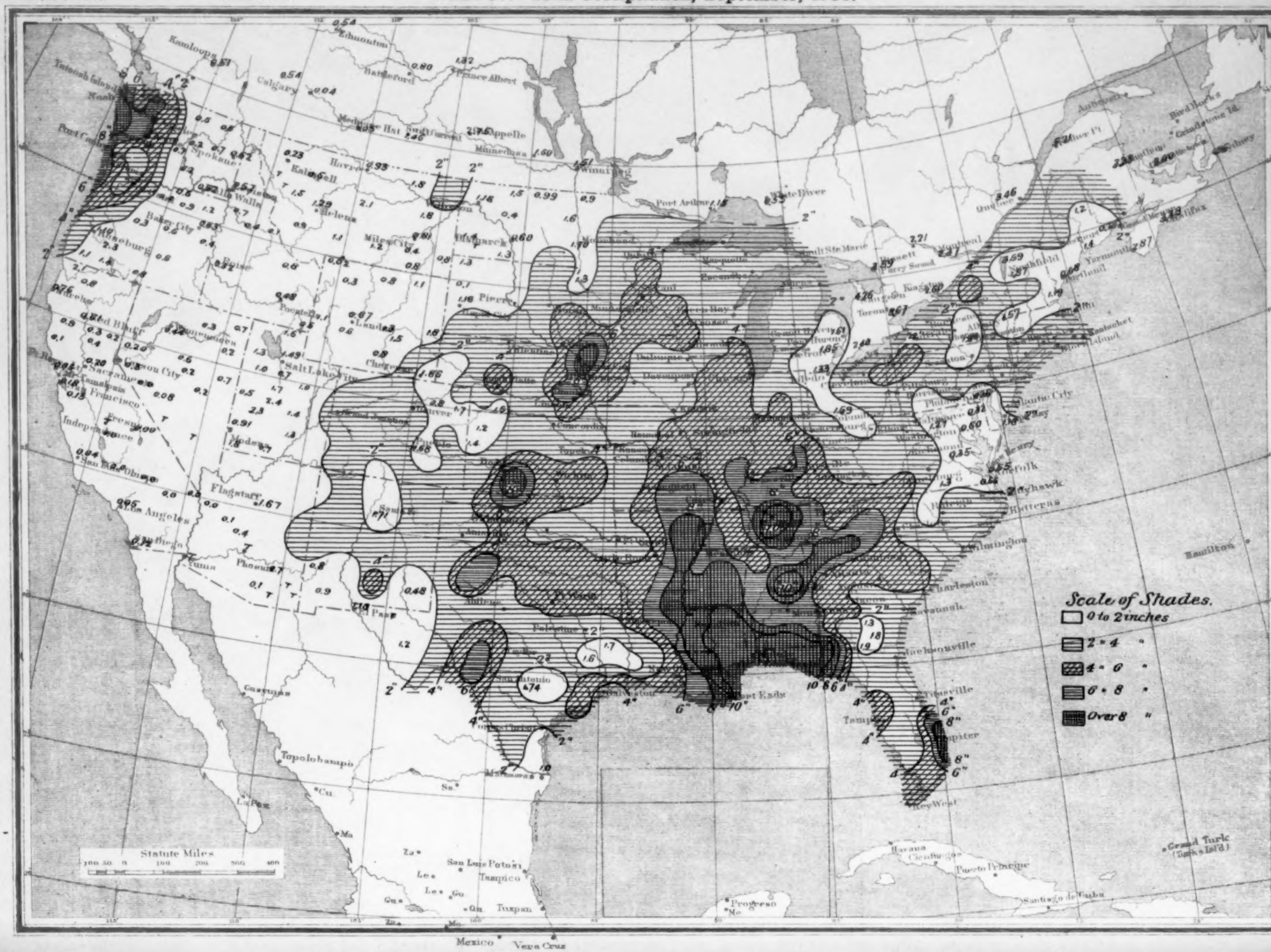


Chart V. Percentage of Clear Sky between Sunrise and Sunset, September, 1906.

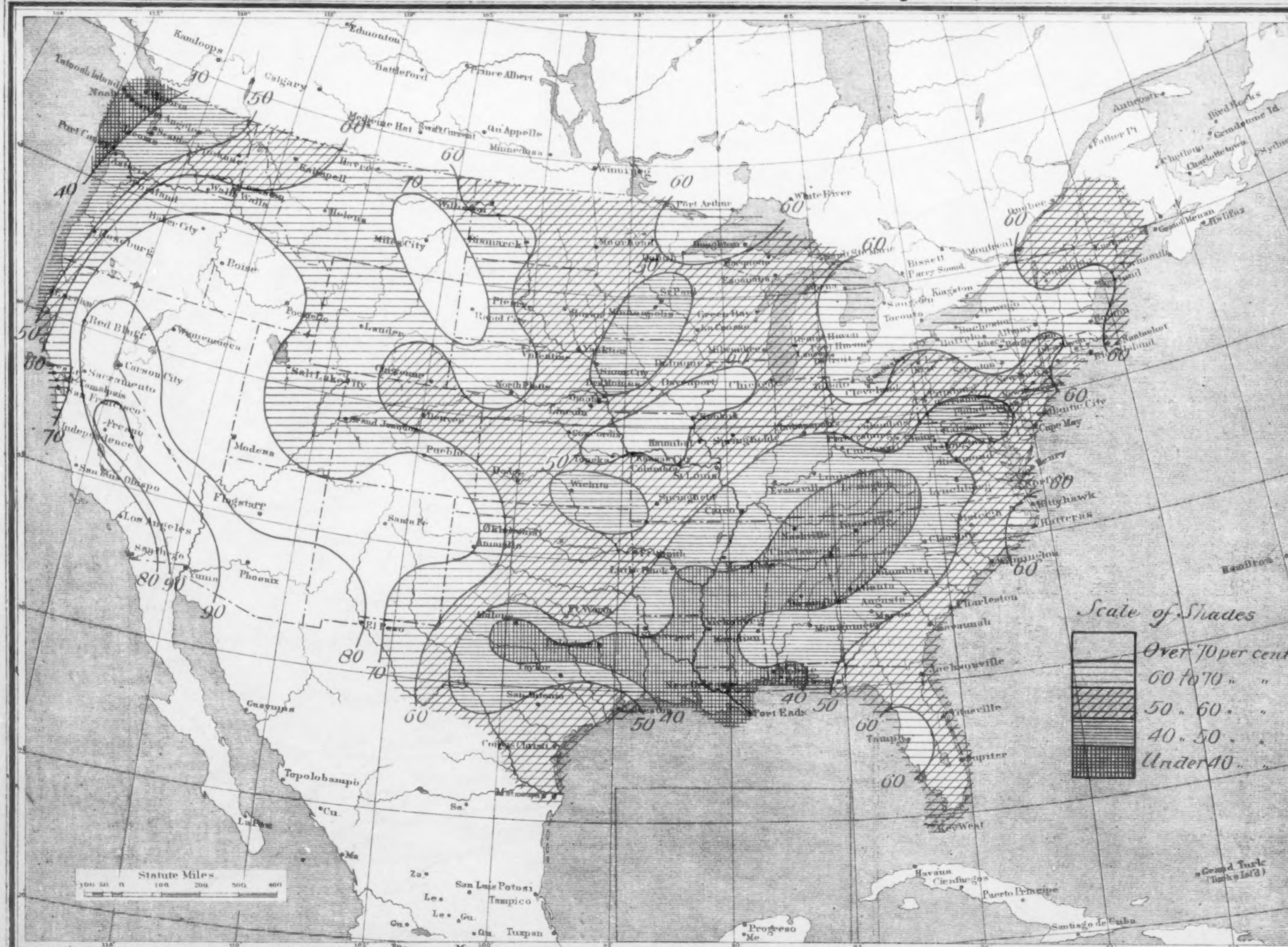


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, September, 1906.

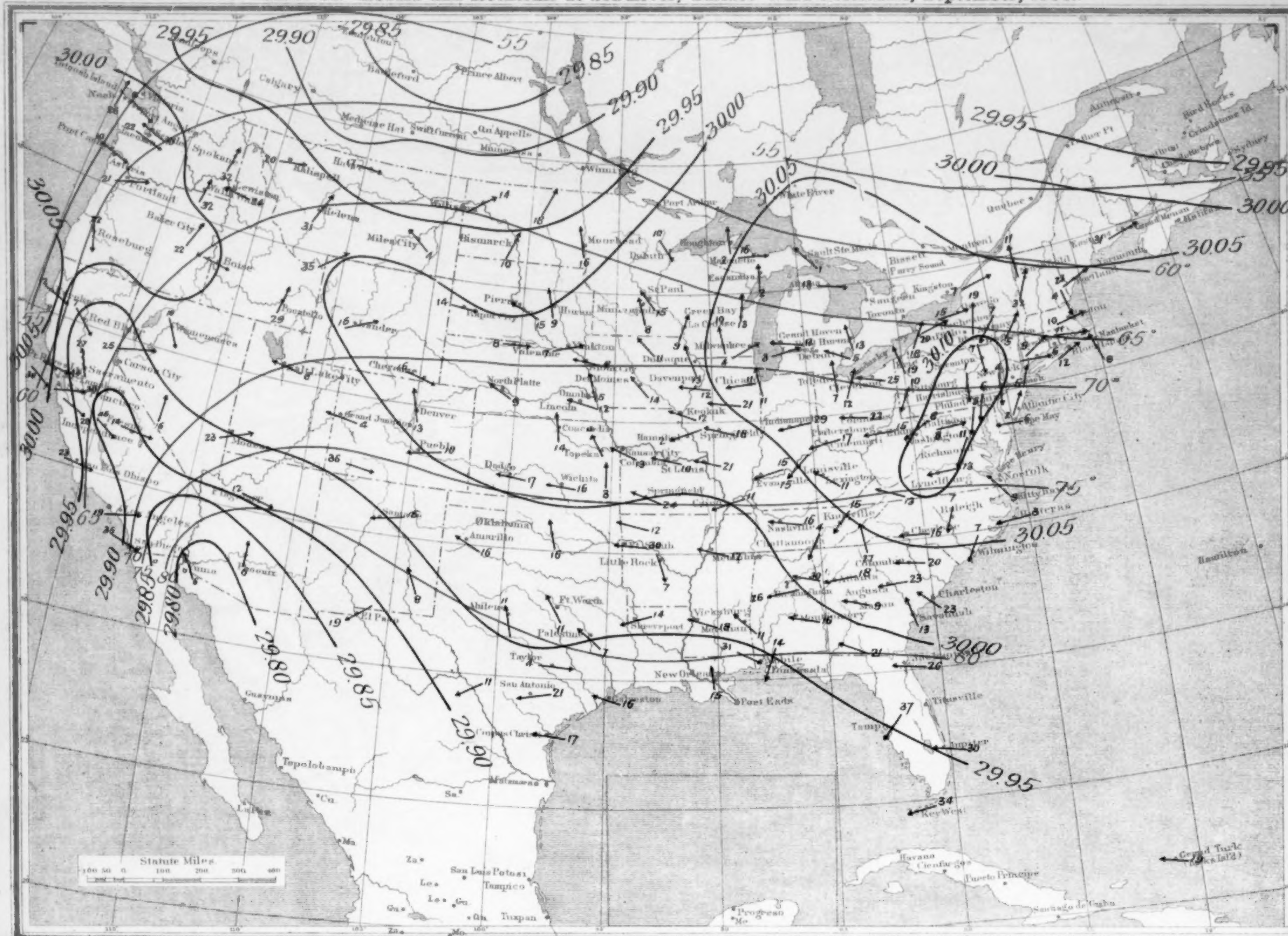


Chart IX. Hurricane tracks for September, 1906.

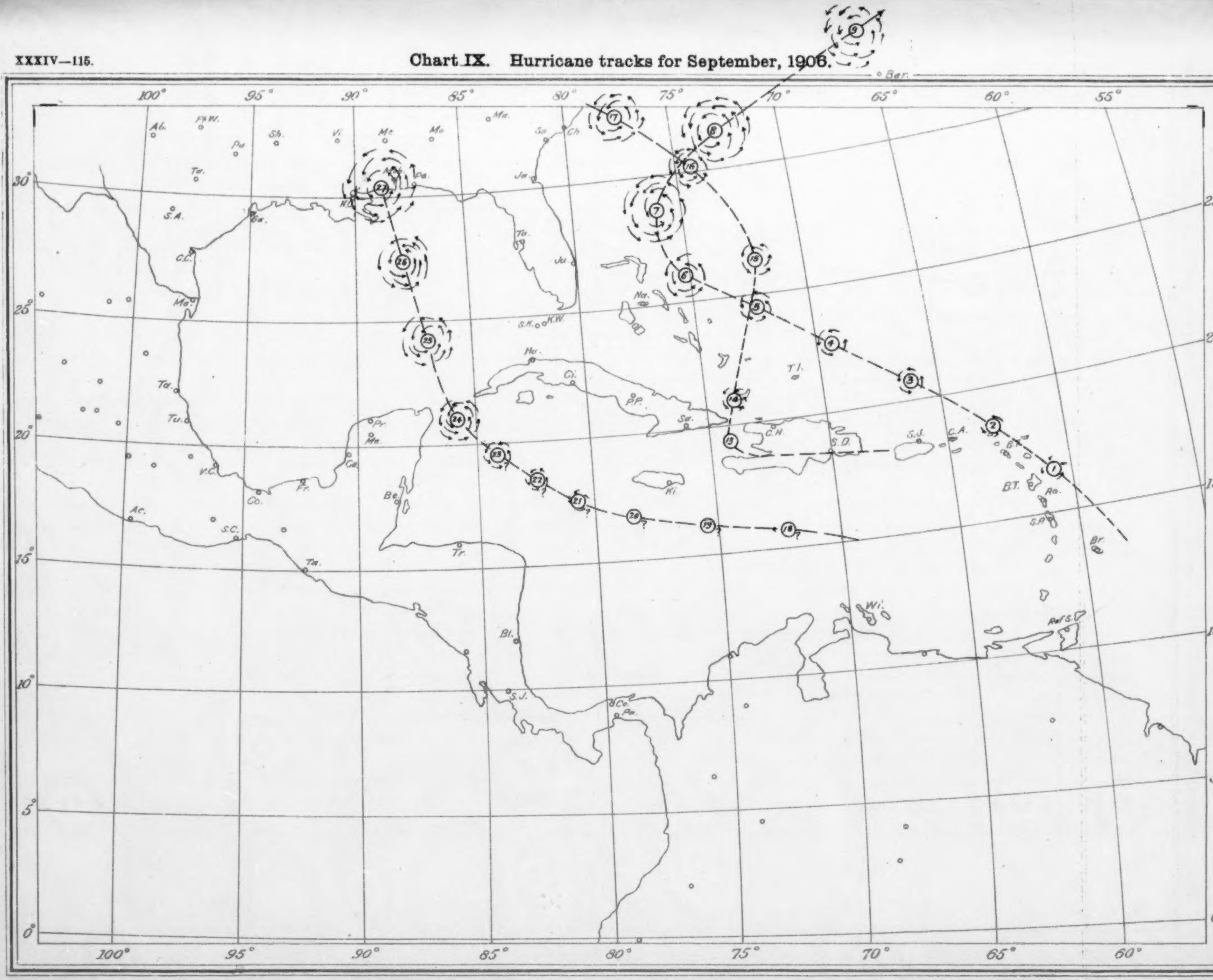
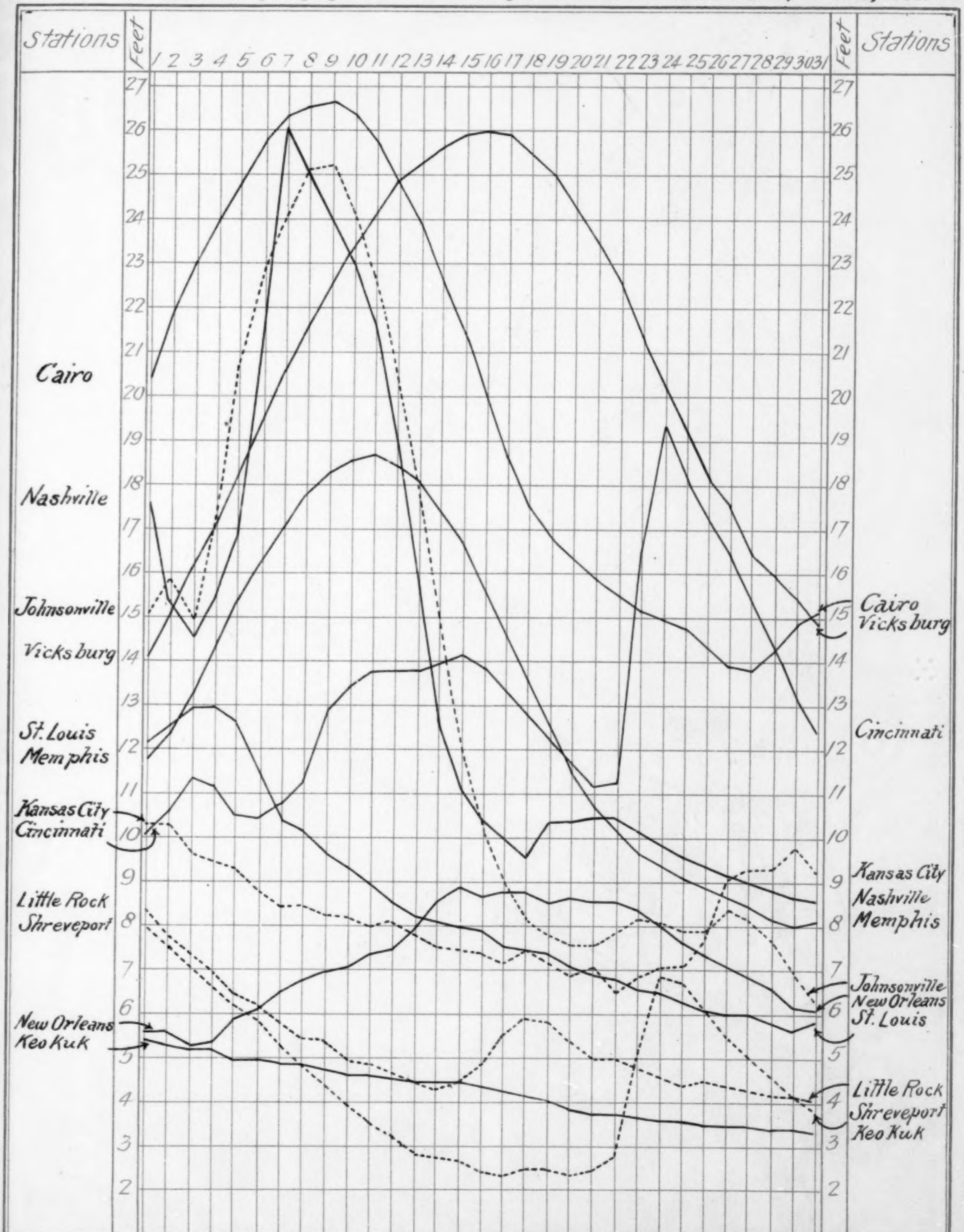


Chart I. Hydrographs for Seven Principal Rivers of the United States, October, 1906.



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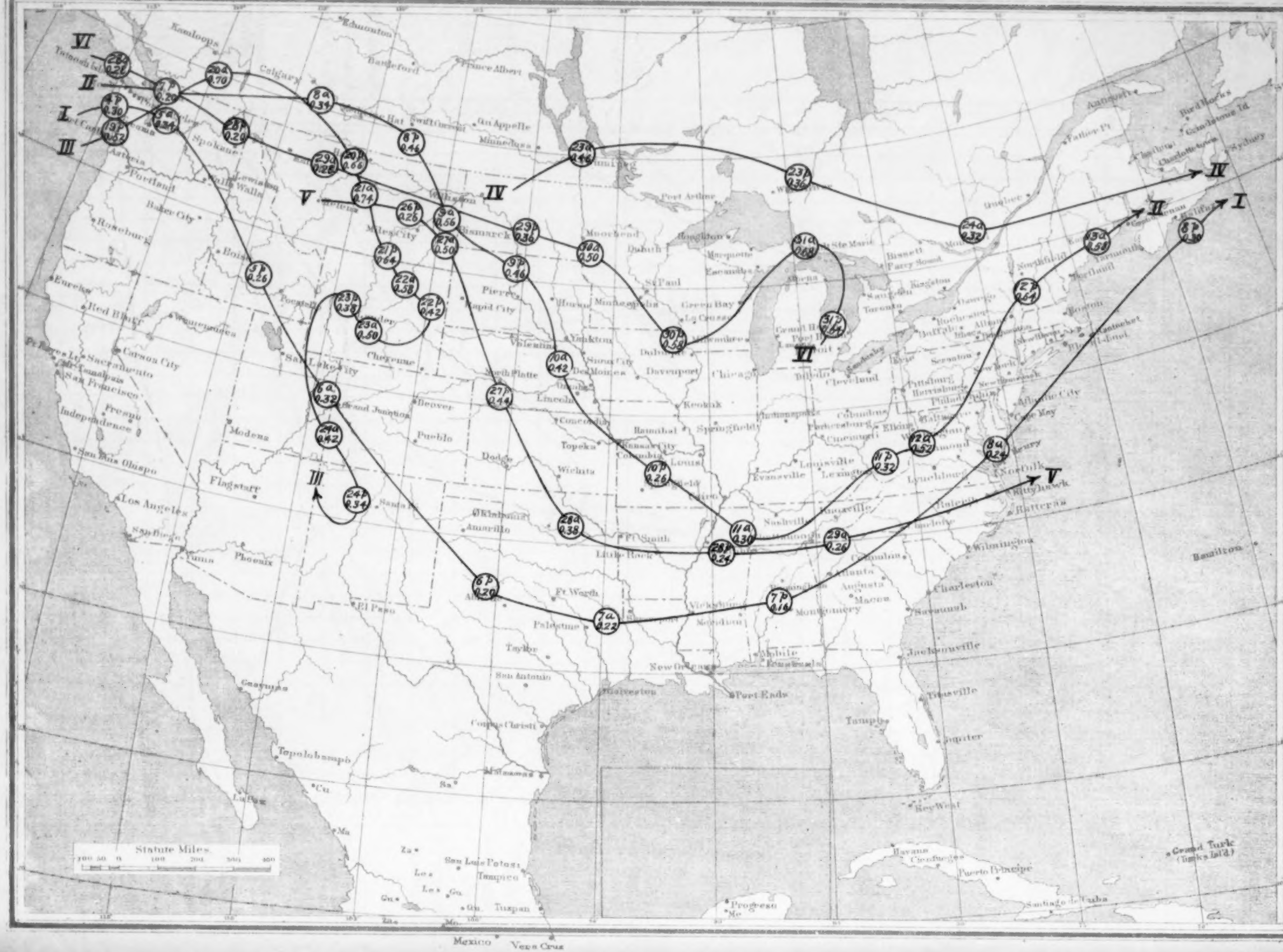

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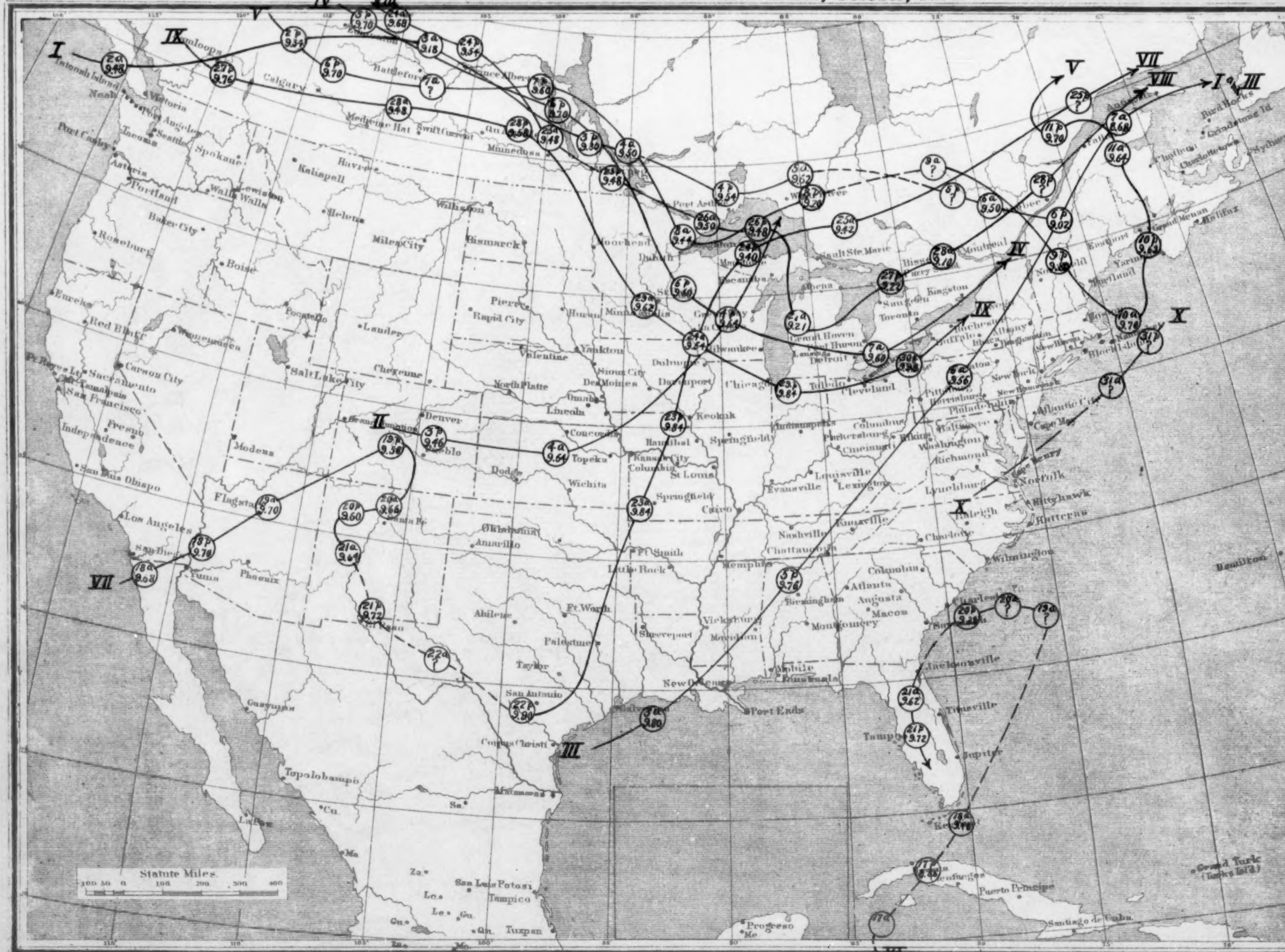

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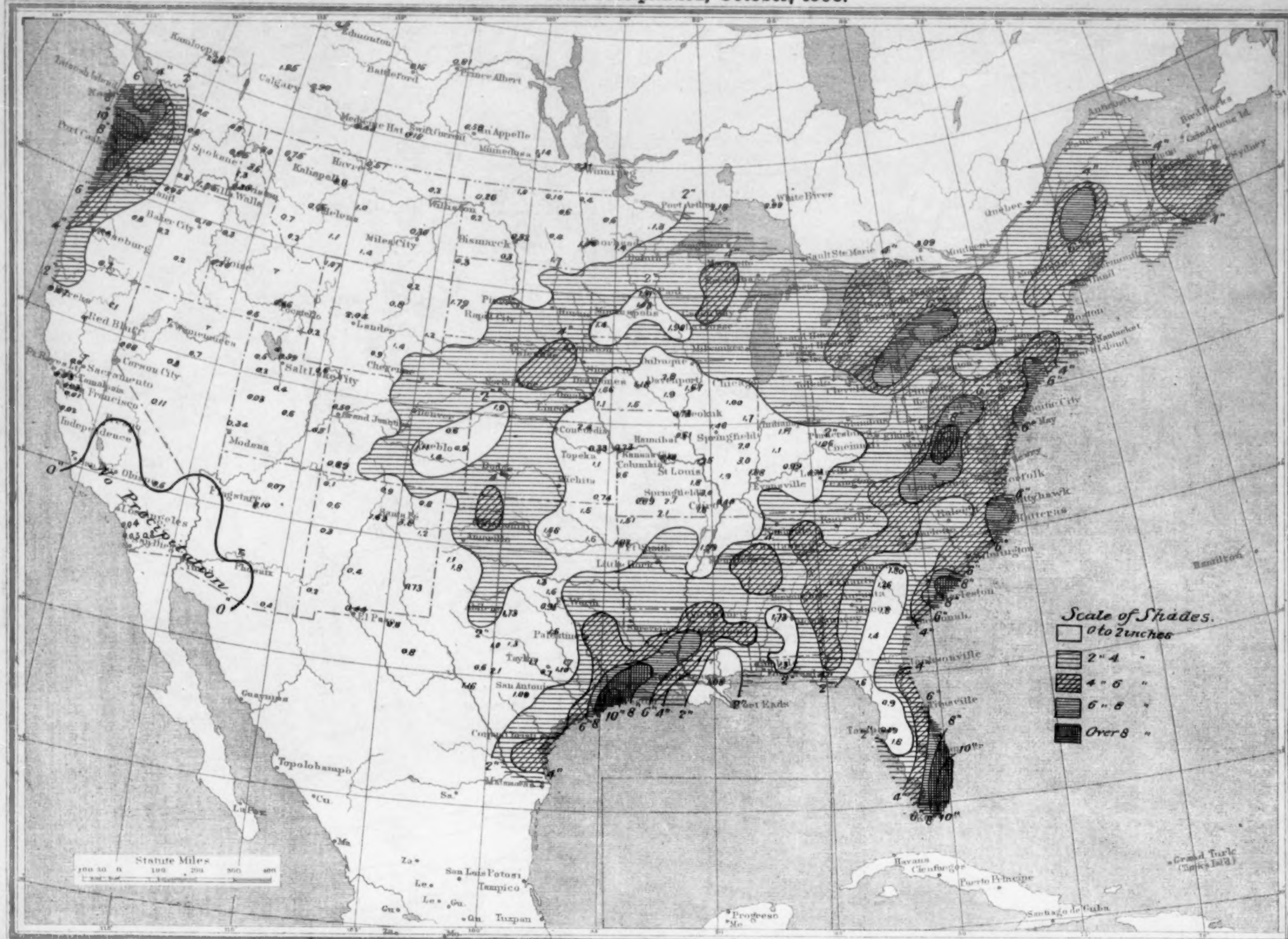

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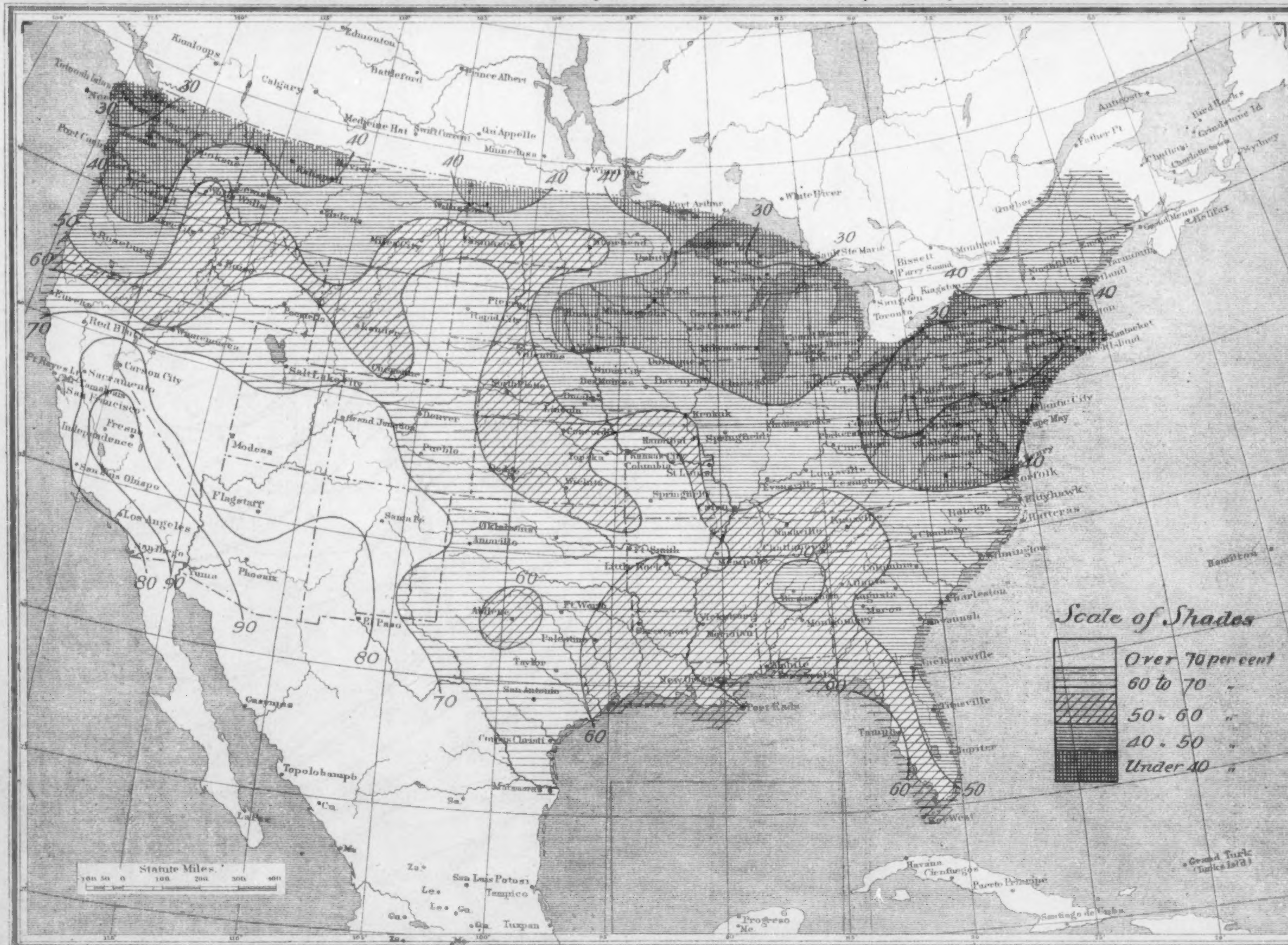

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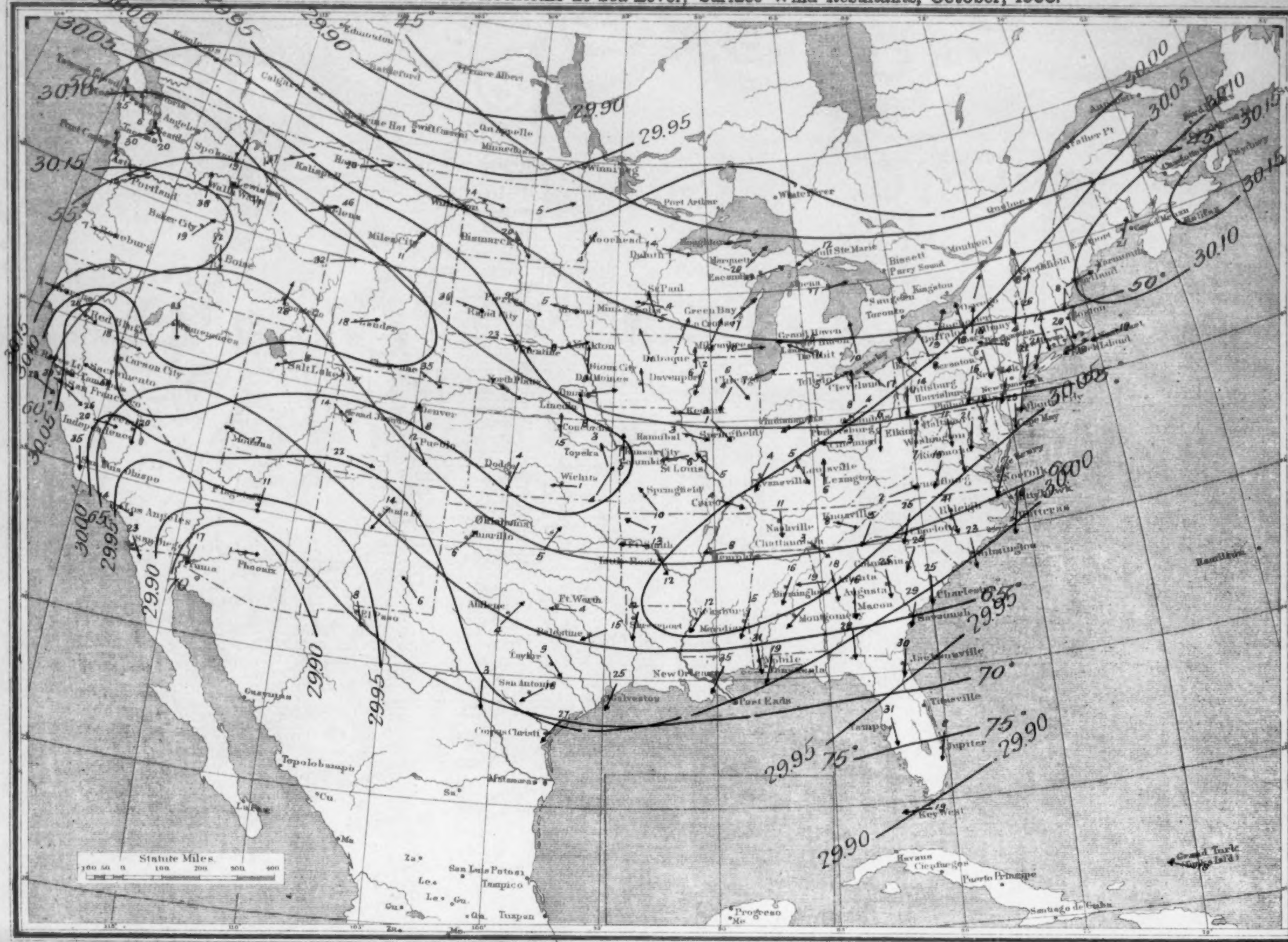
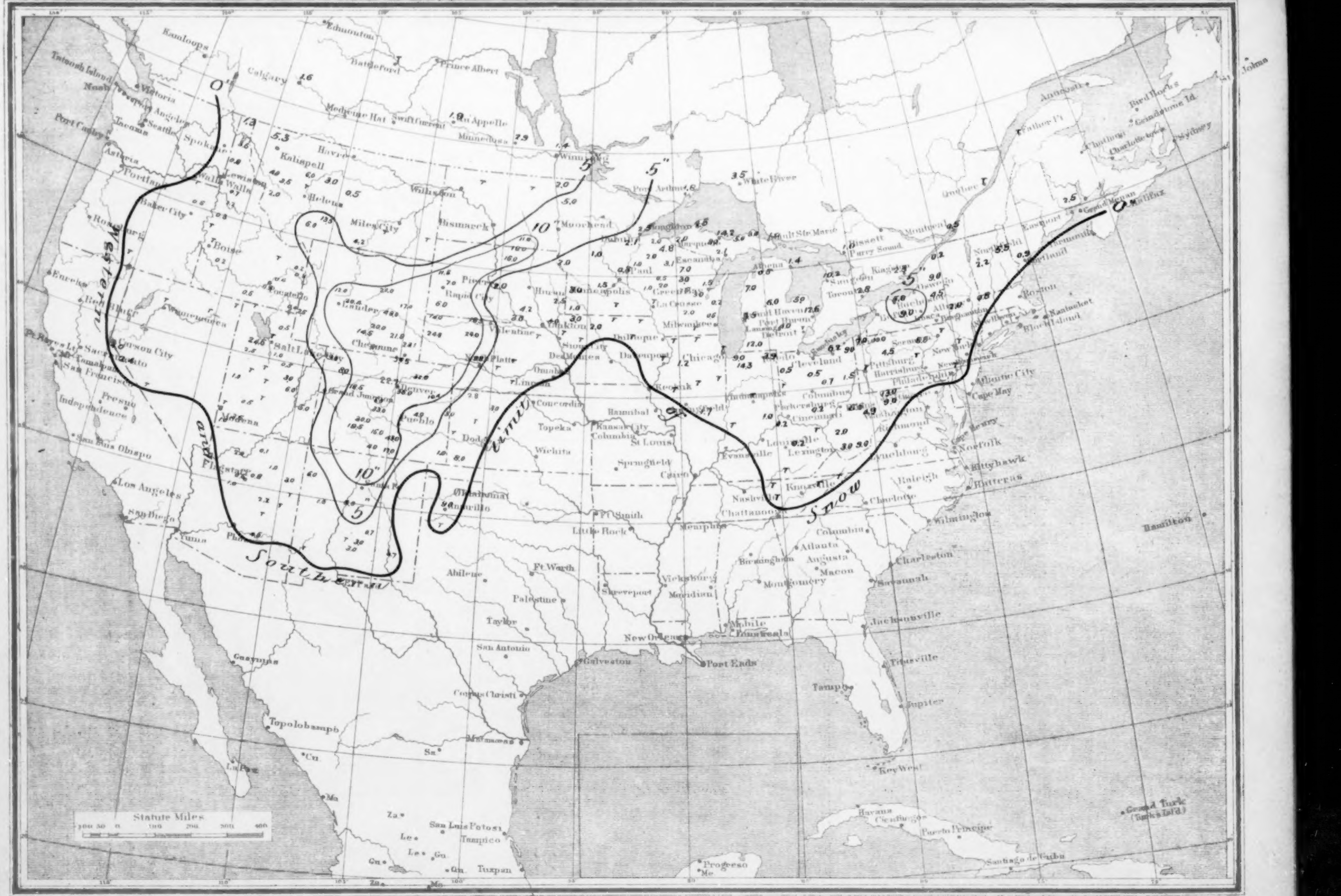


Chart VII. Total Snowfall for October, 1906.



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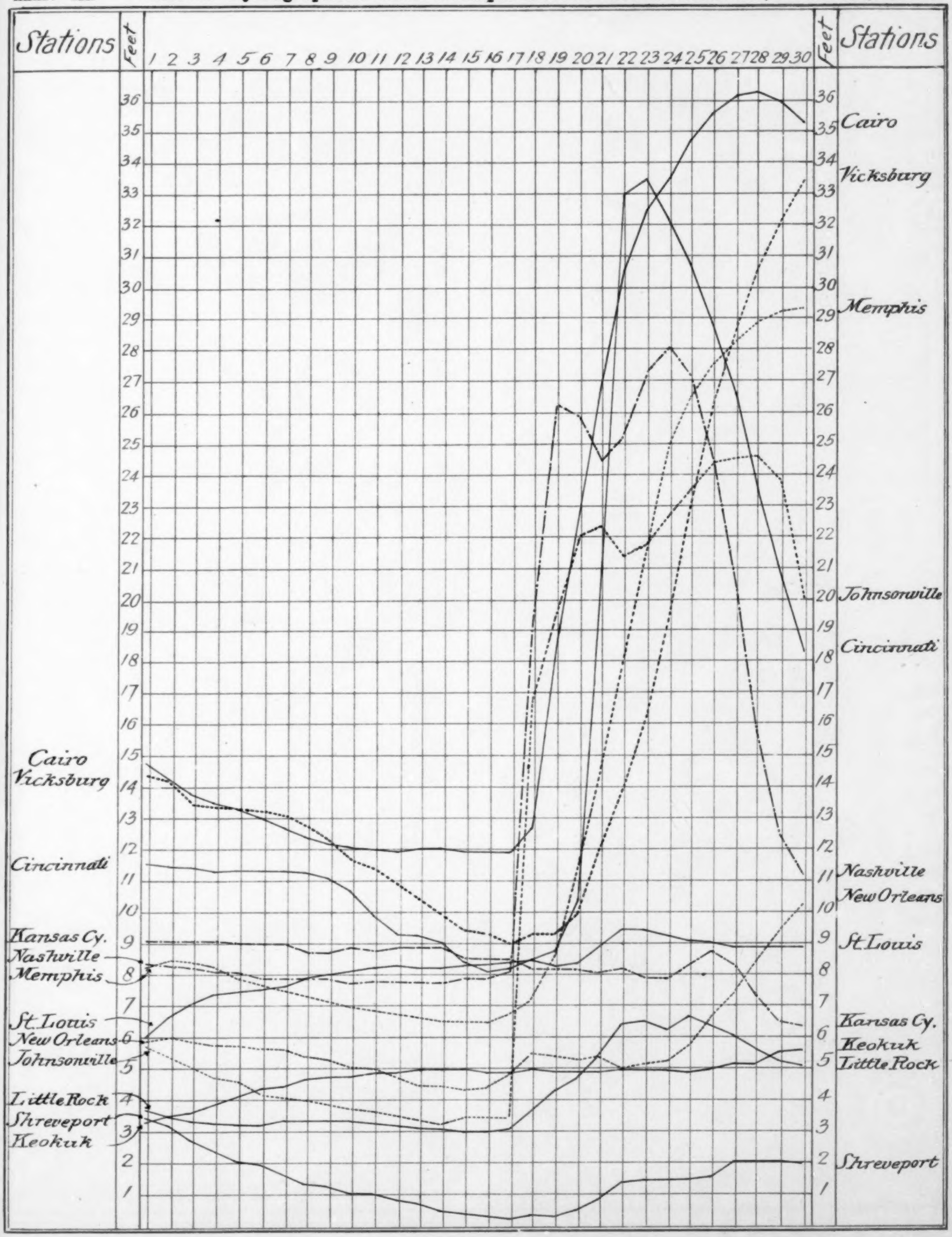

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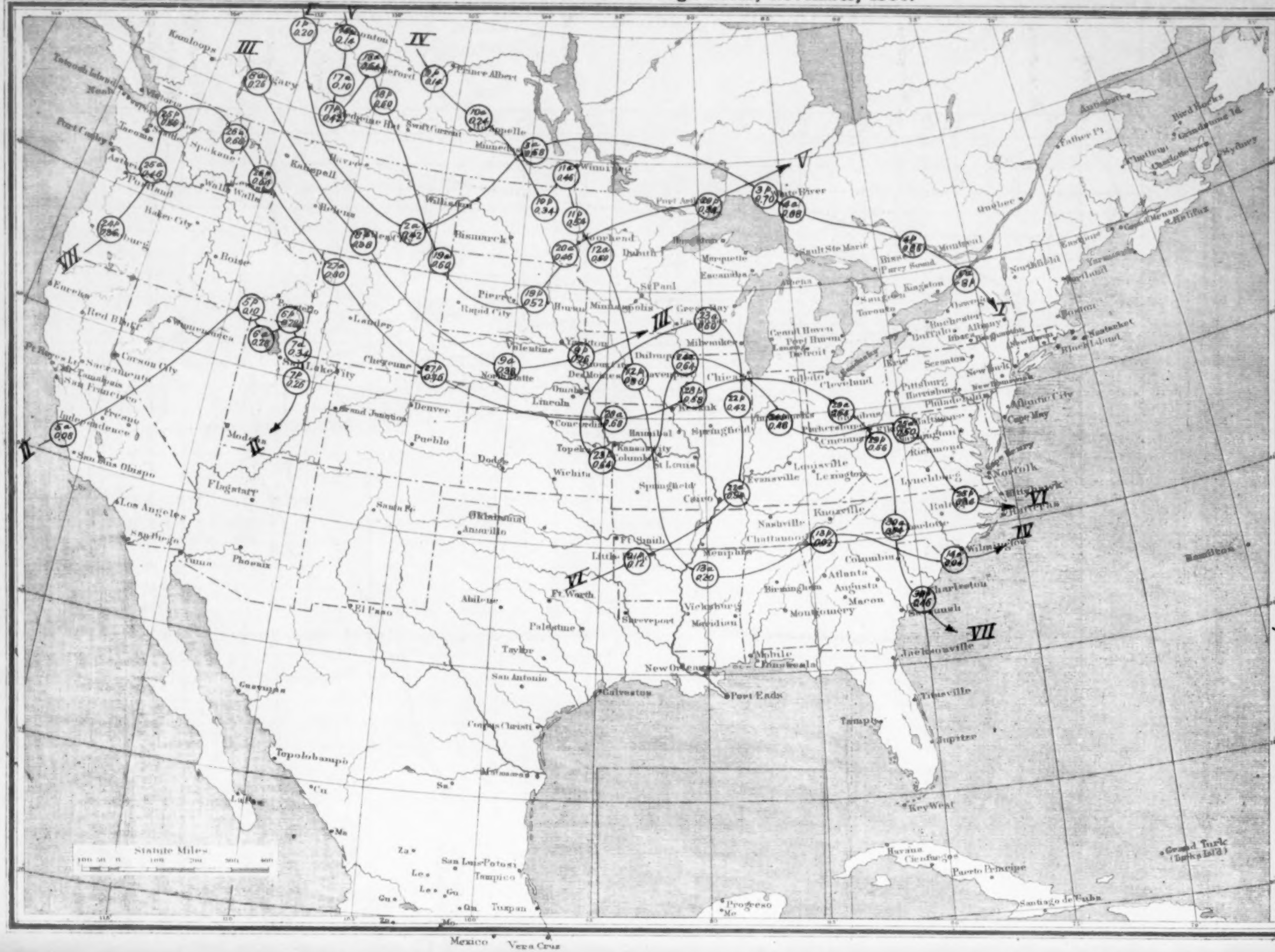

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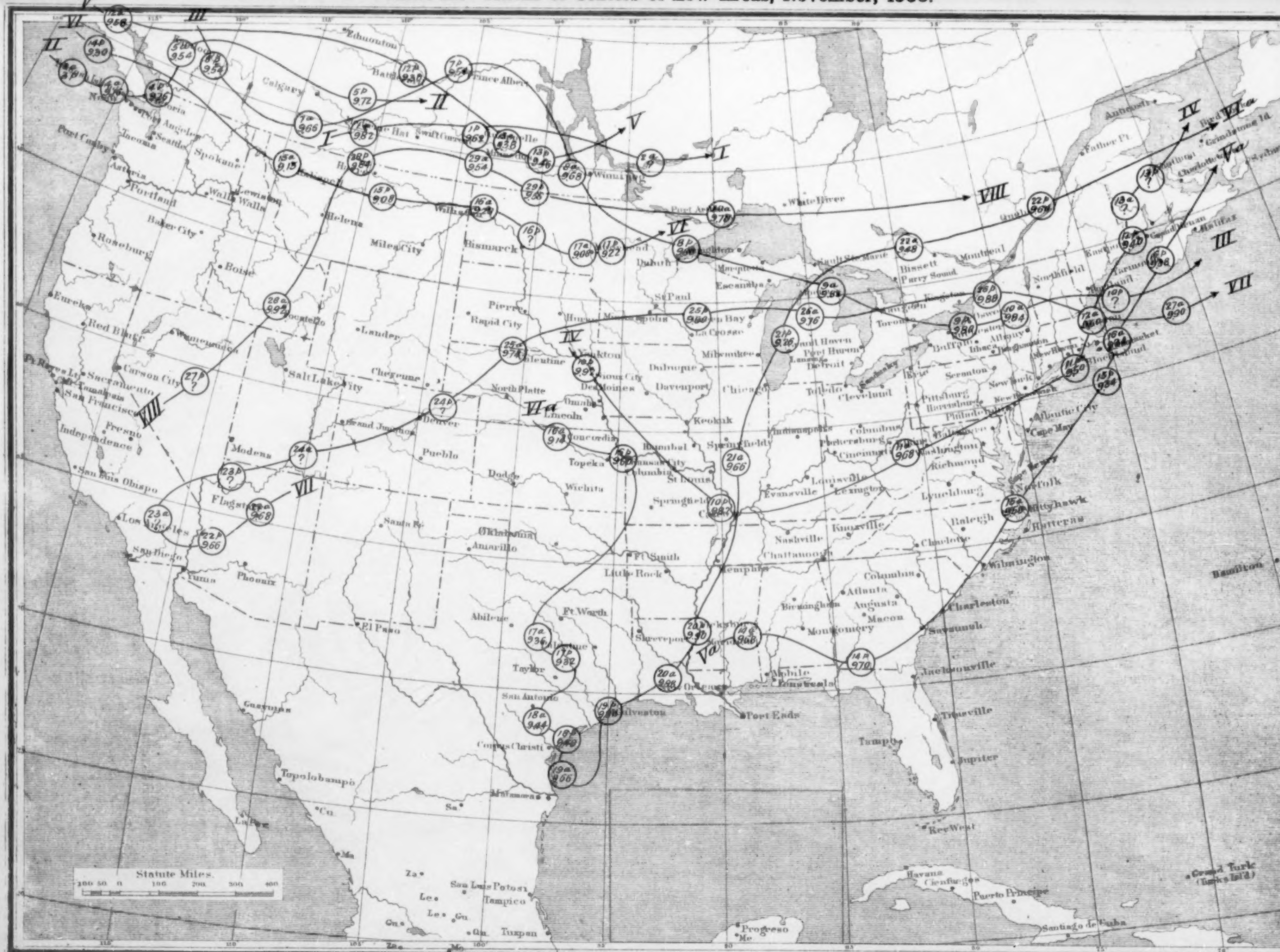

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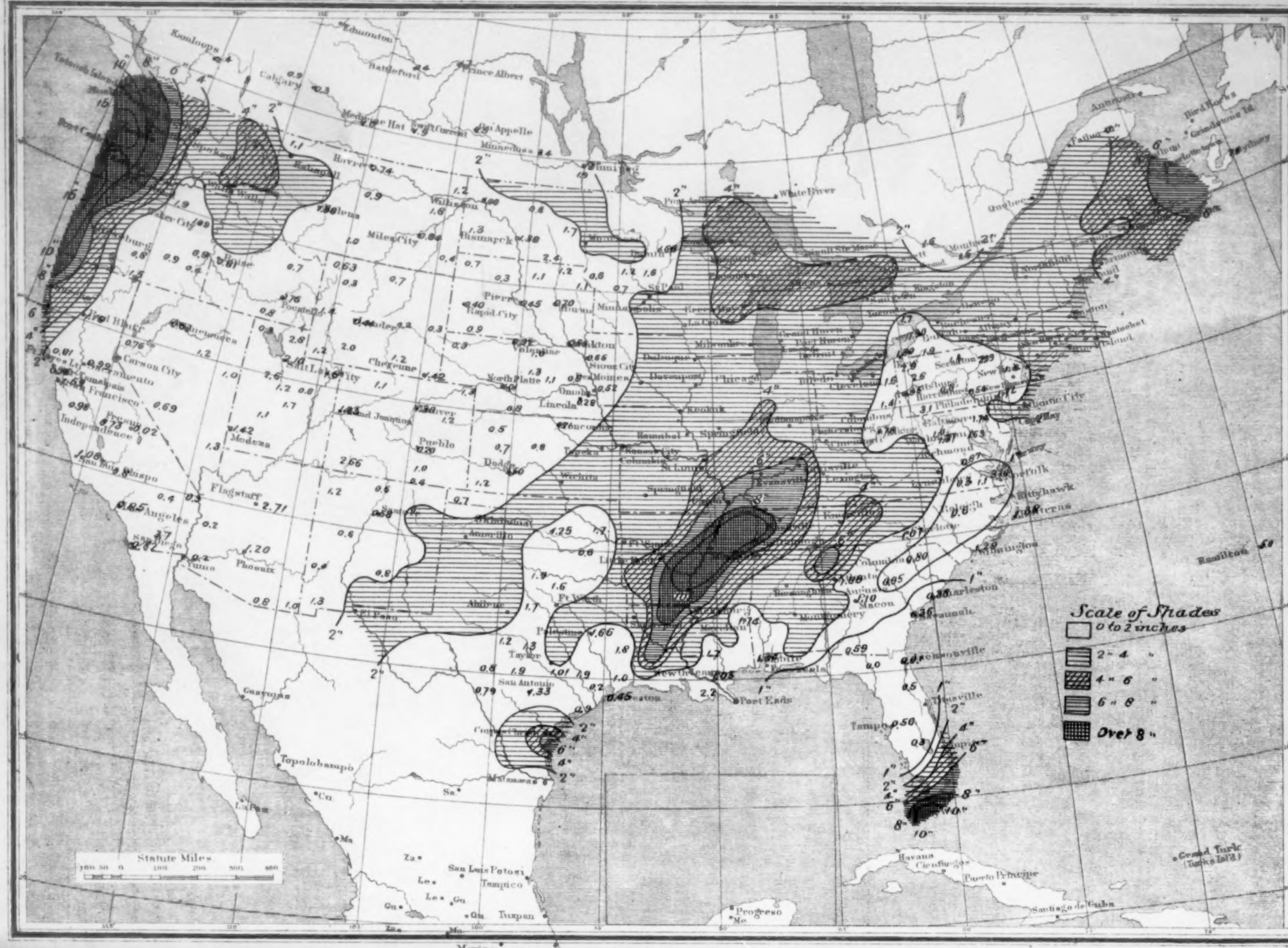

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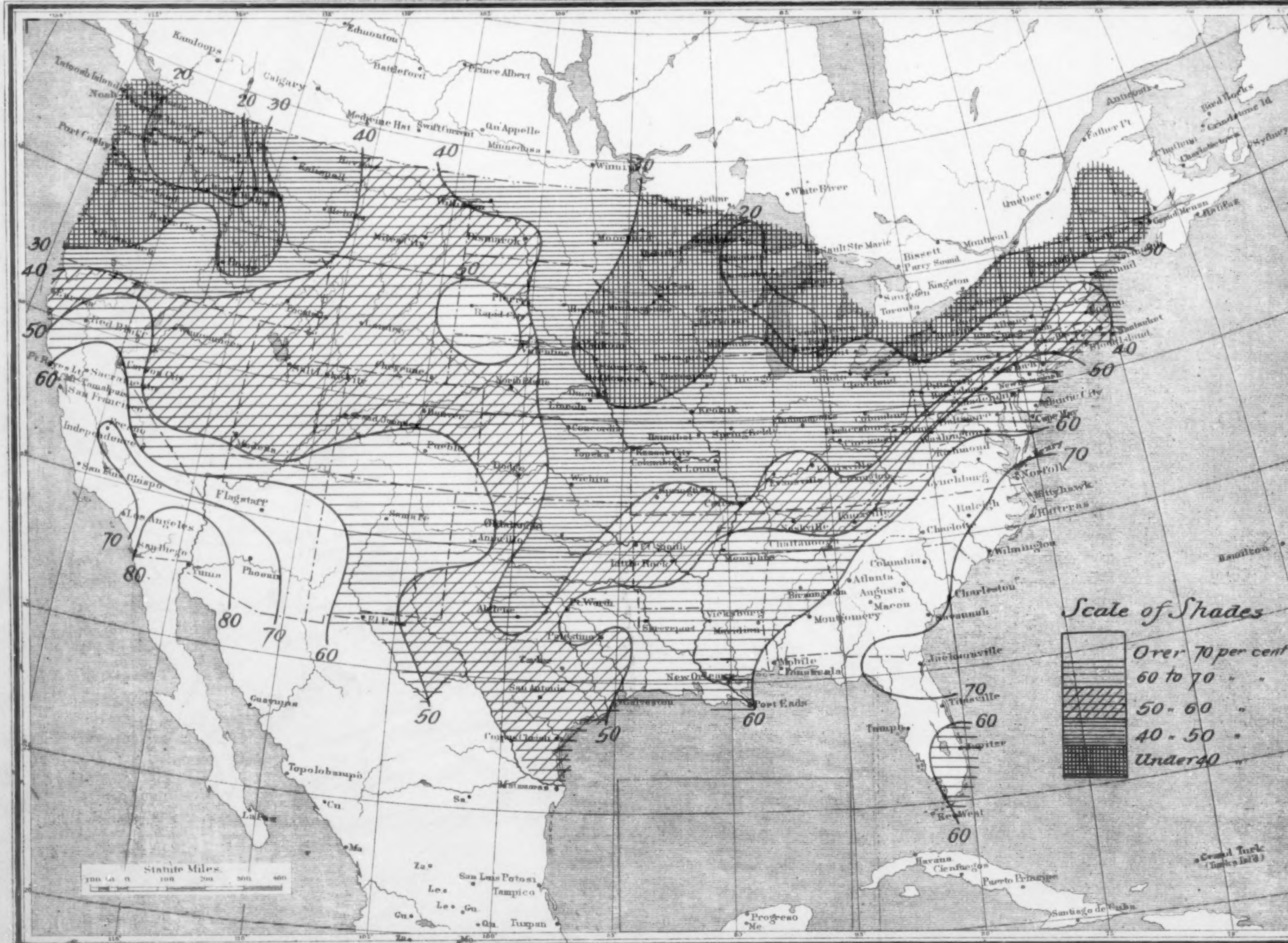

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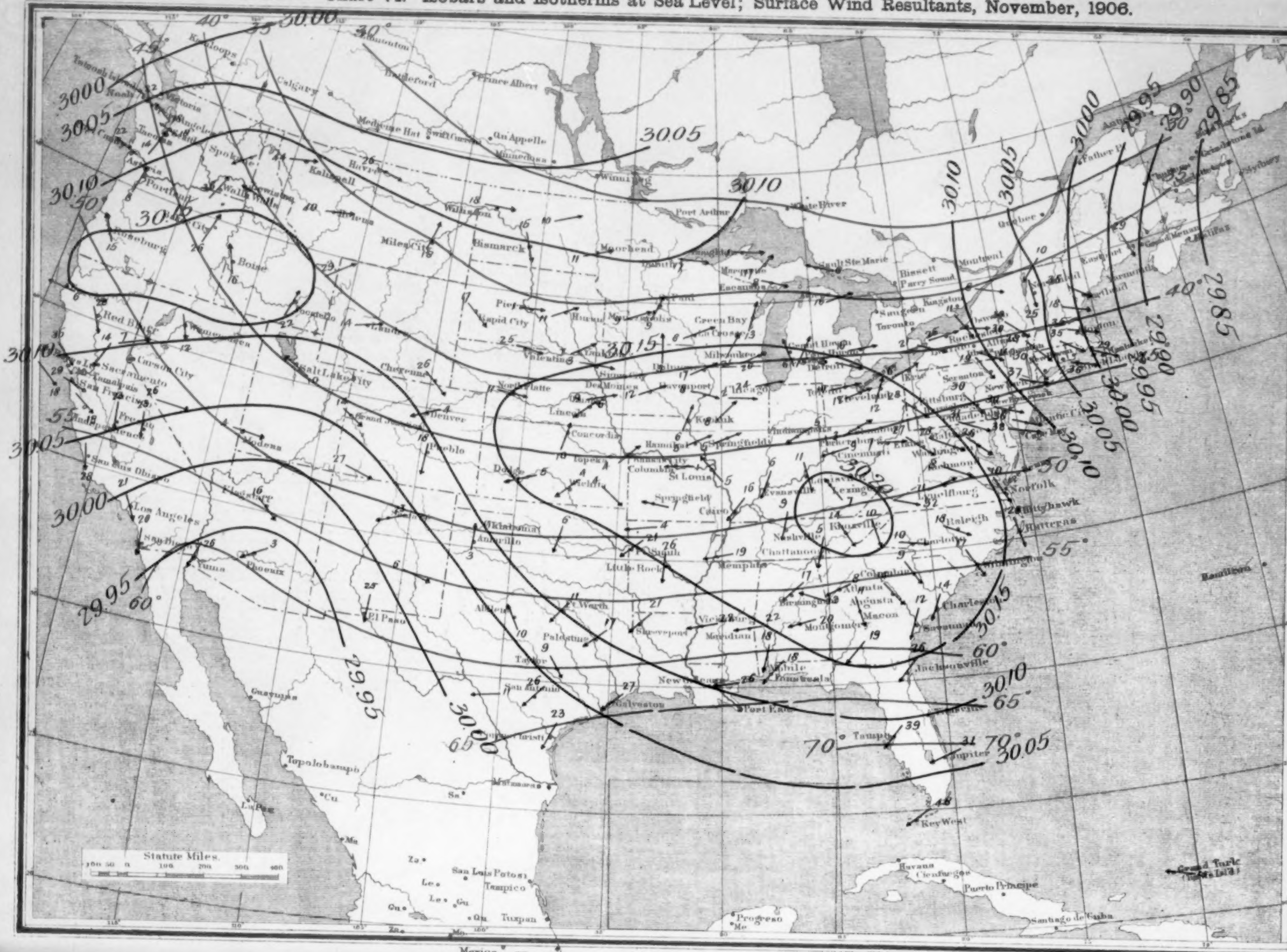

 Barkerville Chart VII. Total Snowfall for November, 1906.

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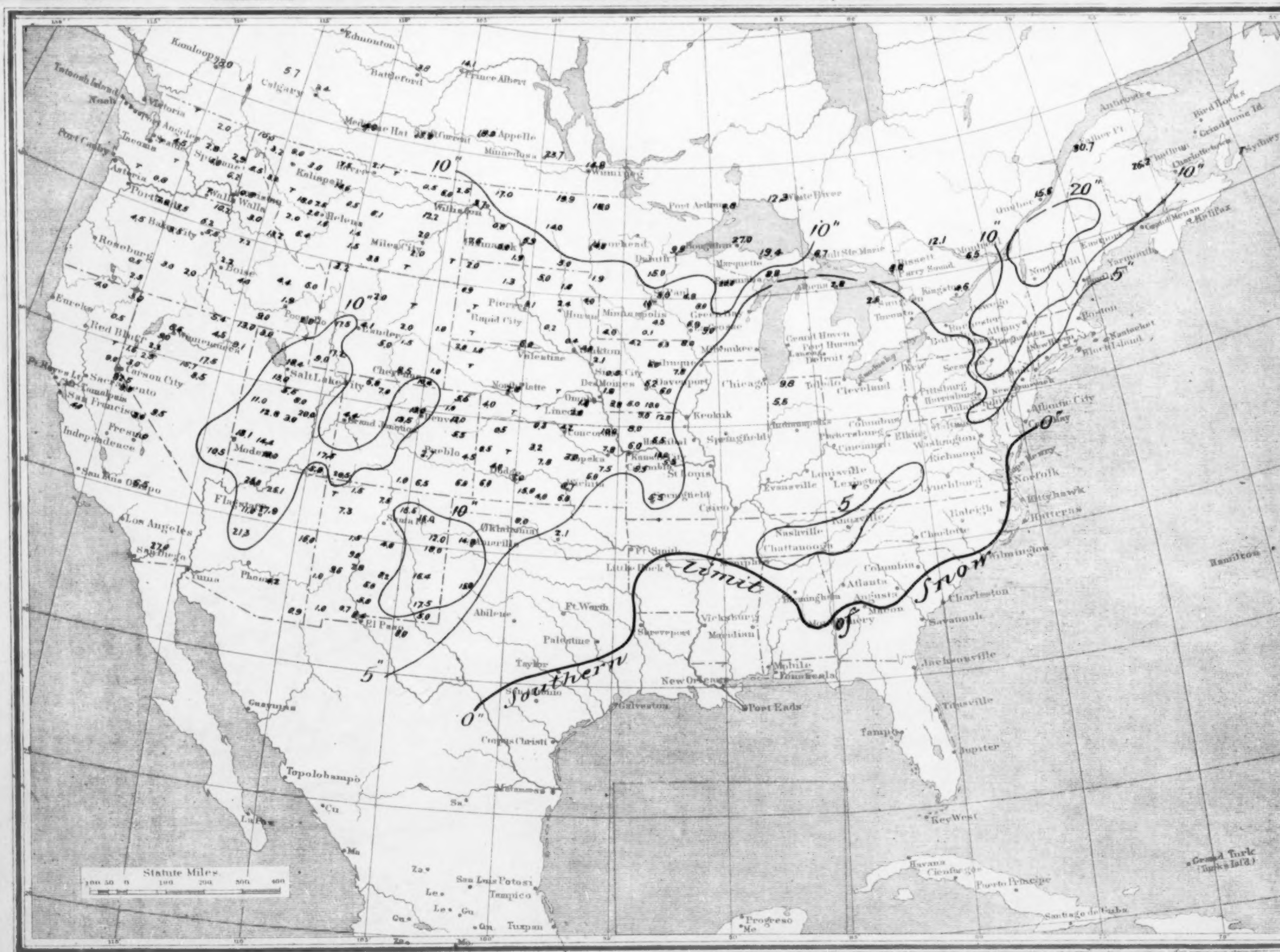


Chart VIII. Depth of Snow on ground November 30, 1906.

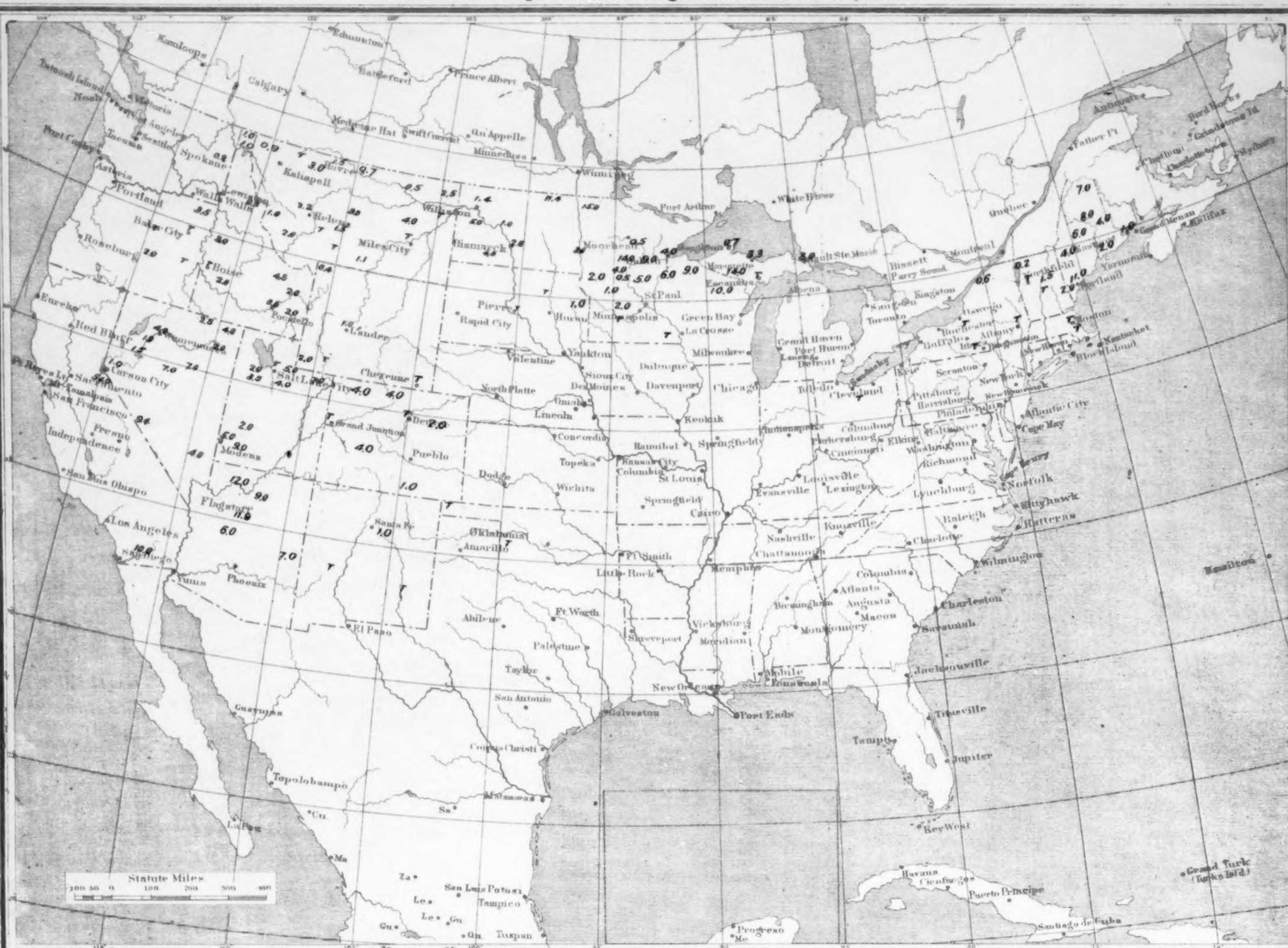
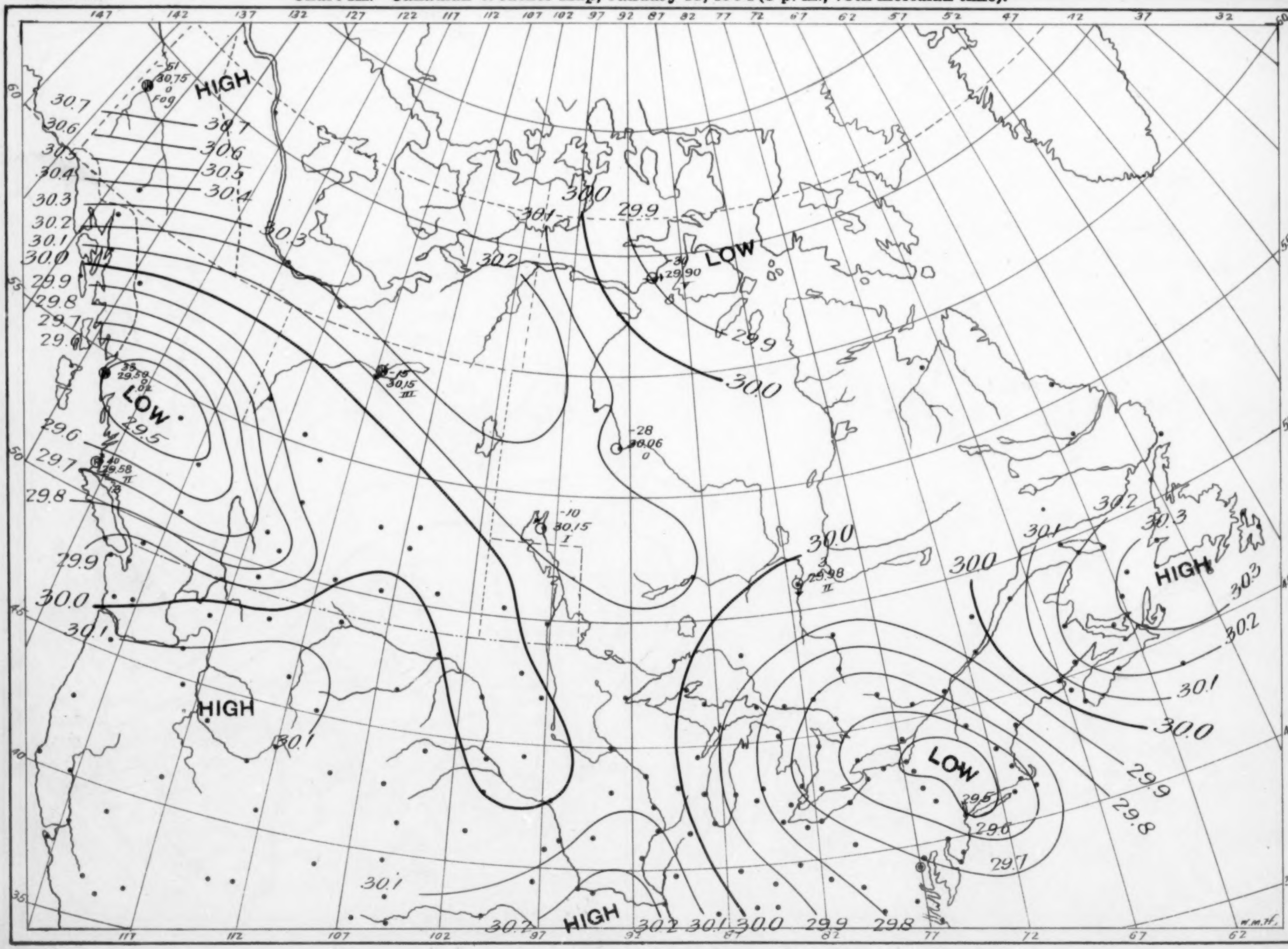


Chart IX. Canadian Weather Map, January 13, 1904 (8 p. m., 75th meridian time).



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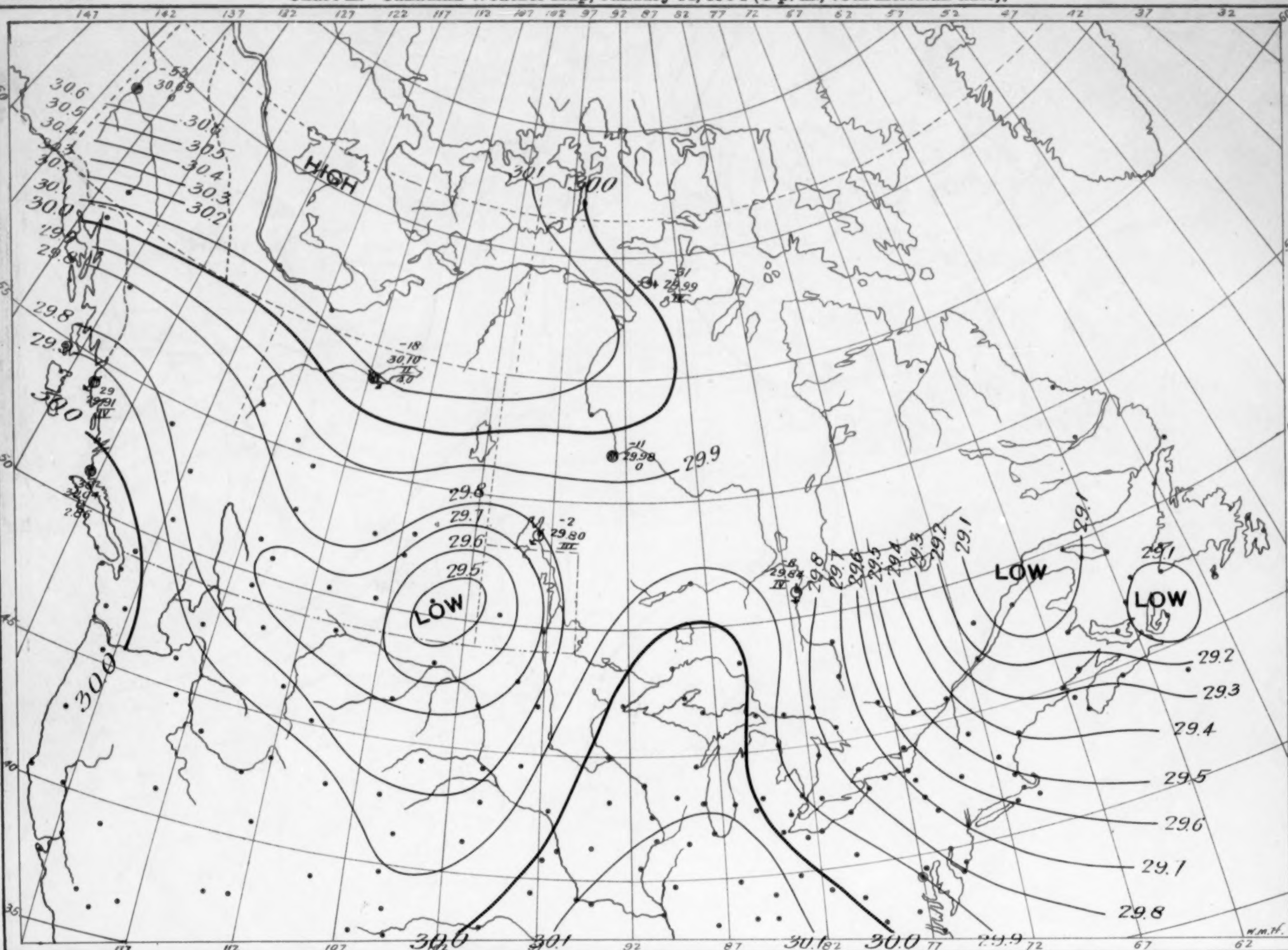

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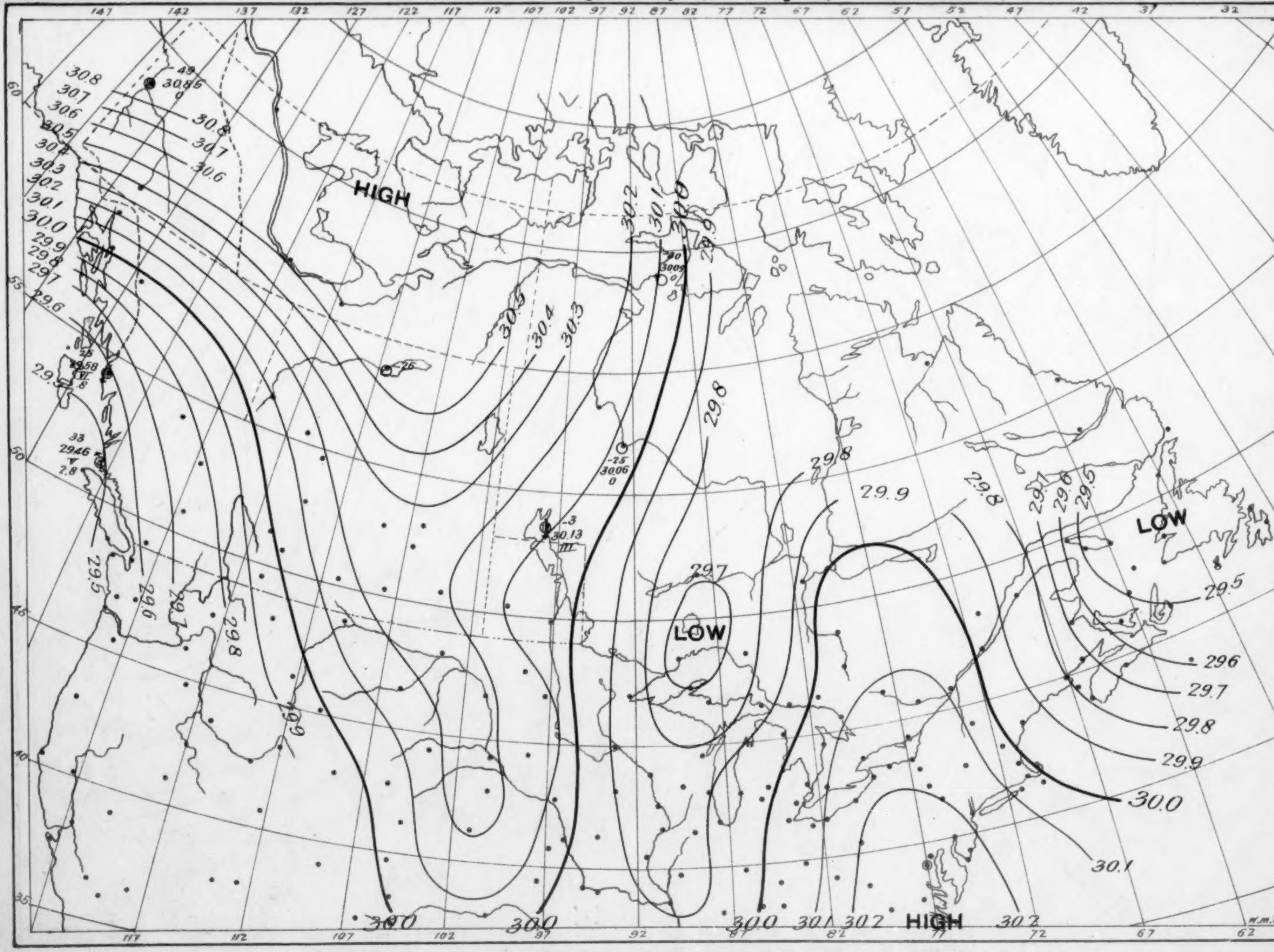

Chart XII. Canadian Weather Map, January 16, 1904 (8 p. m., 75th meridian time).

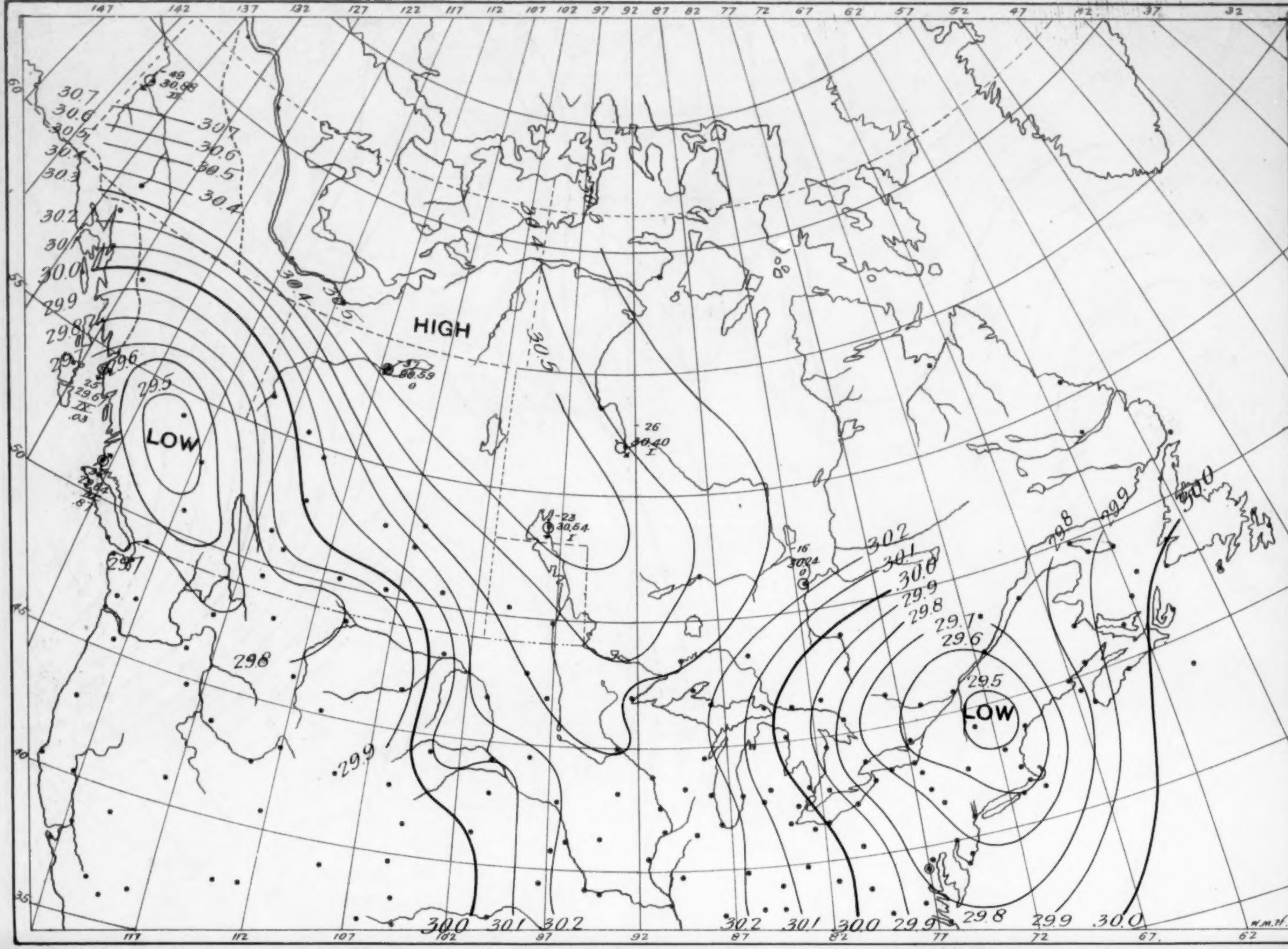

Chart XIII. Canadian Weather Map, January 17, 1904 (8 p. m., 75th meridian time)

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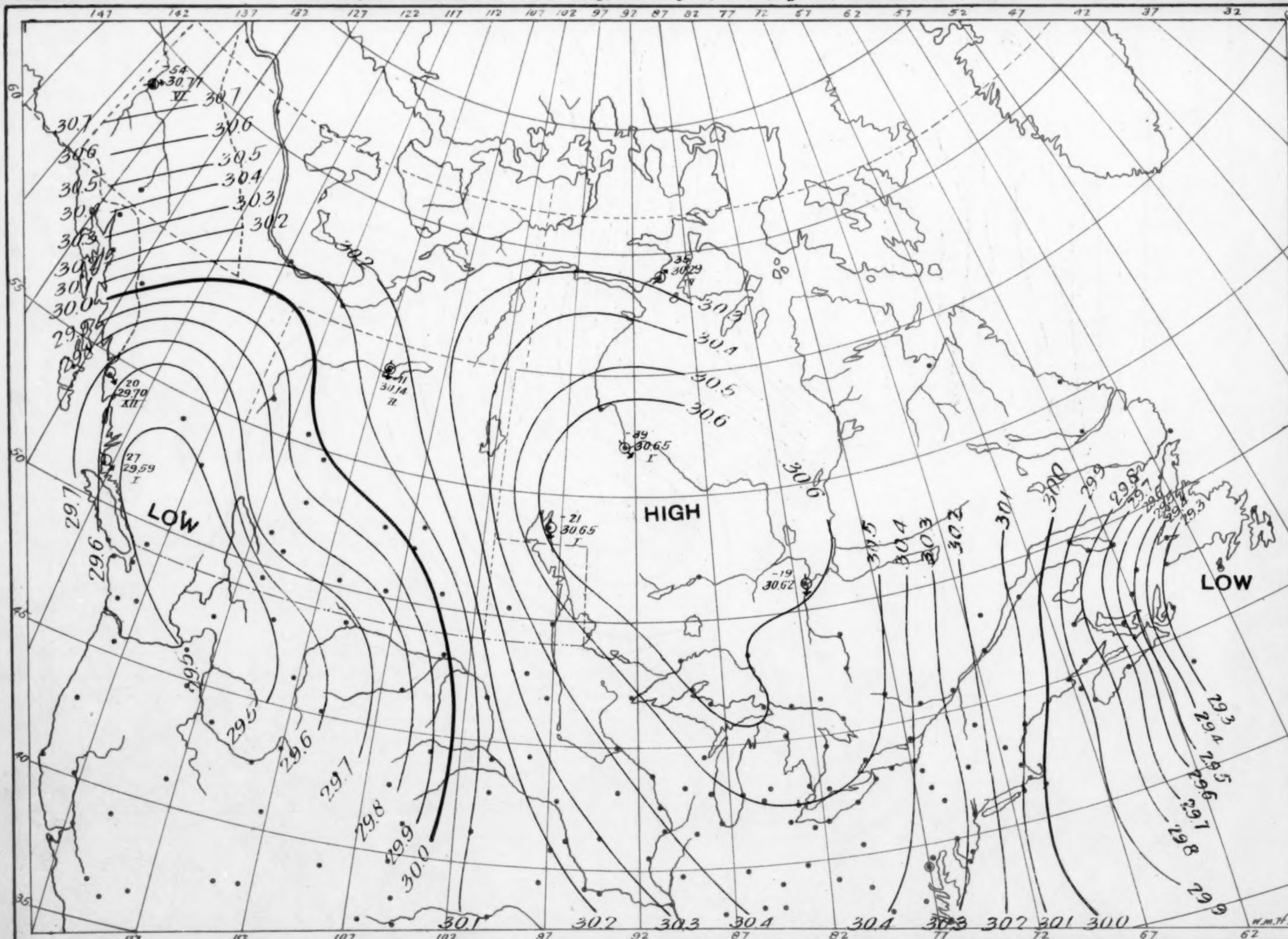

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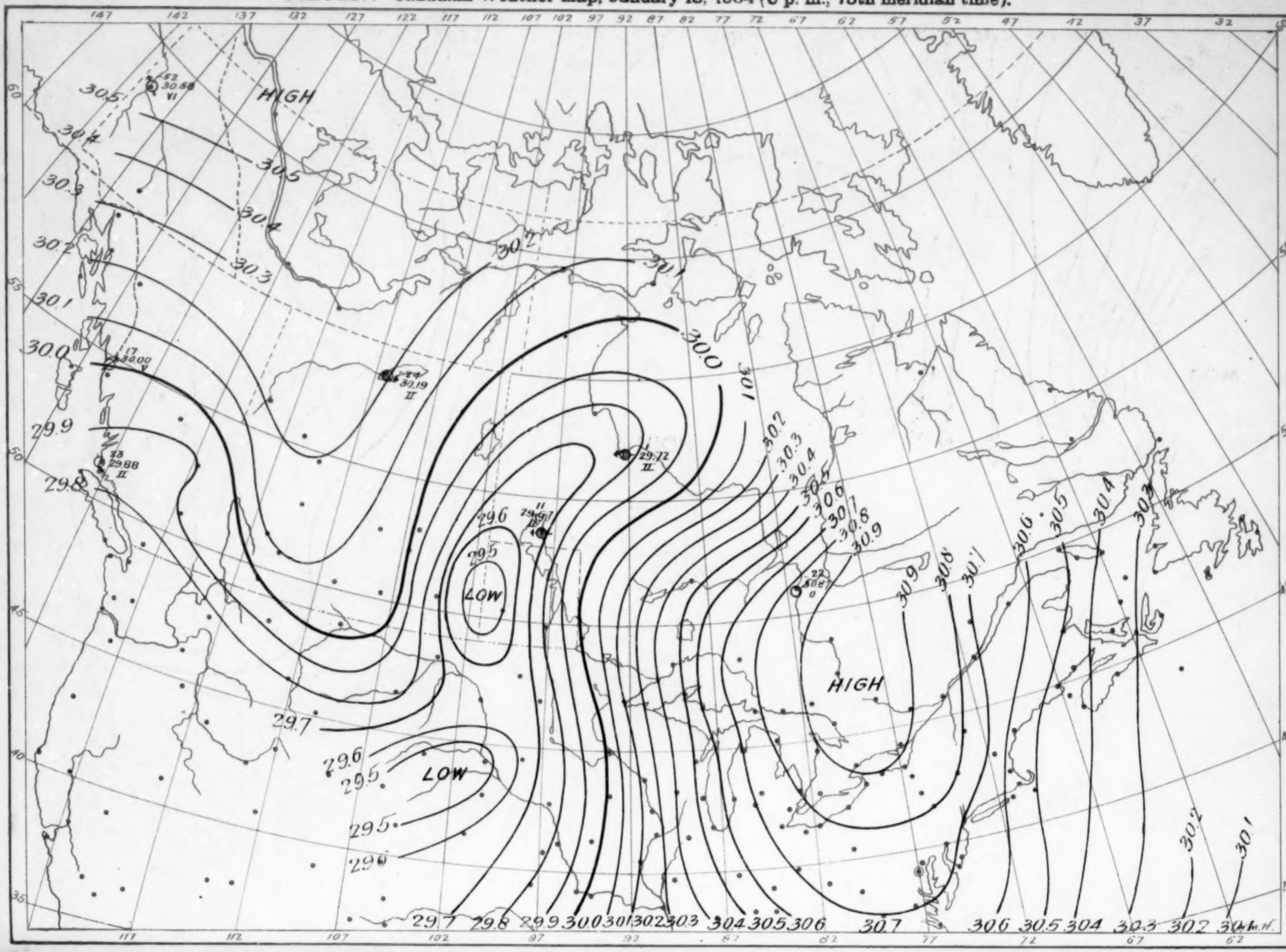

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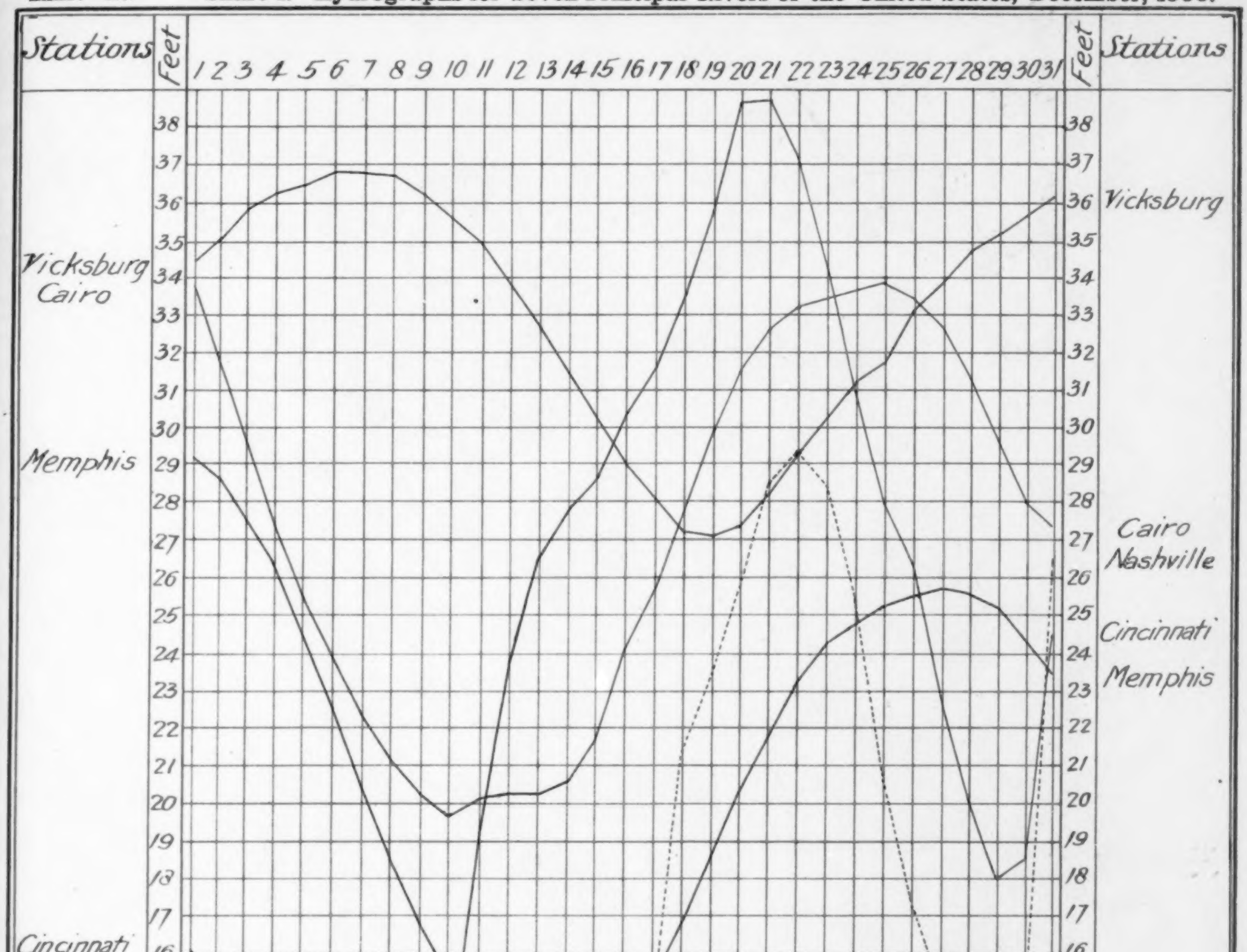

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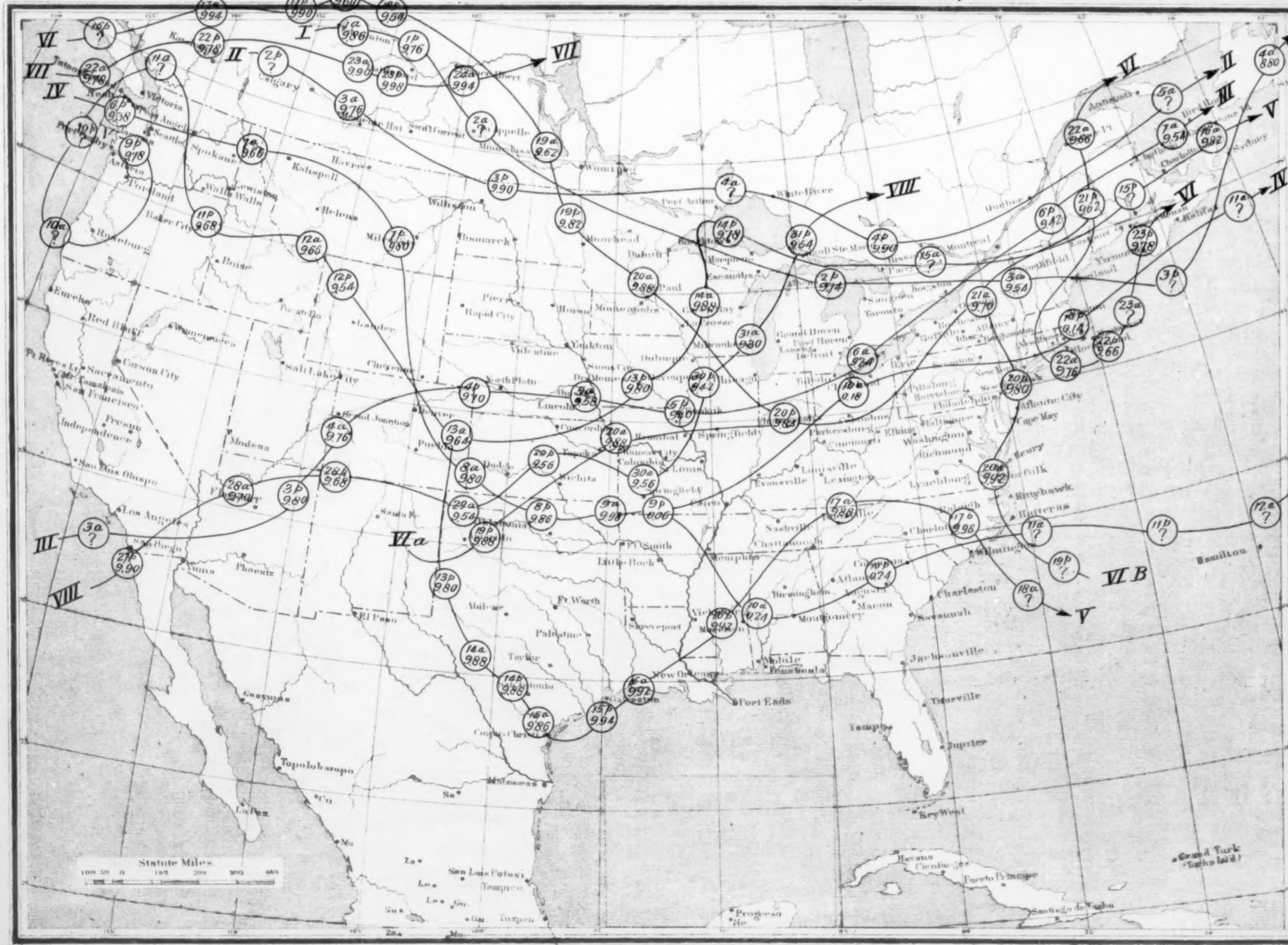

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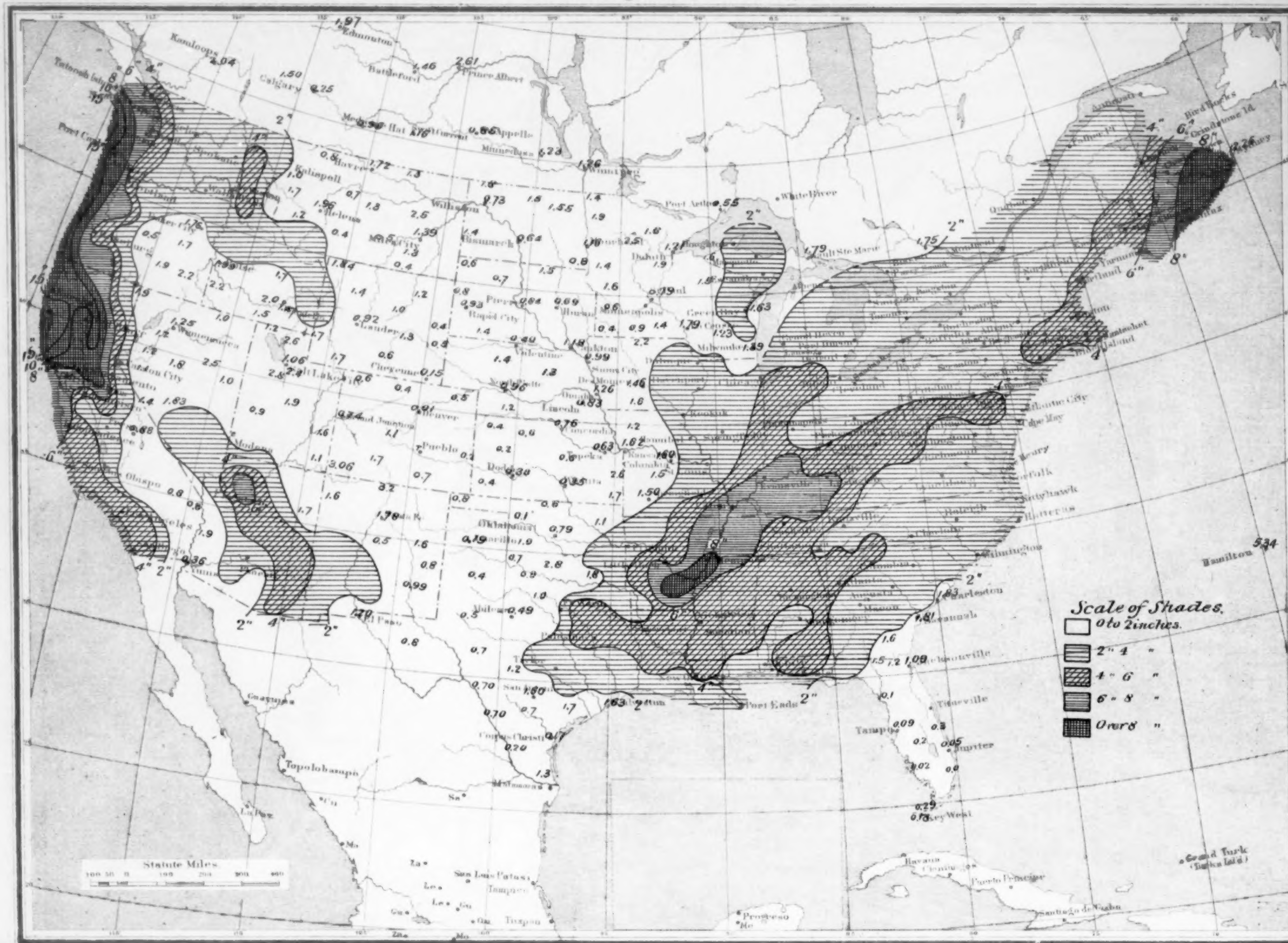

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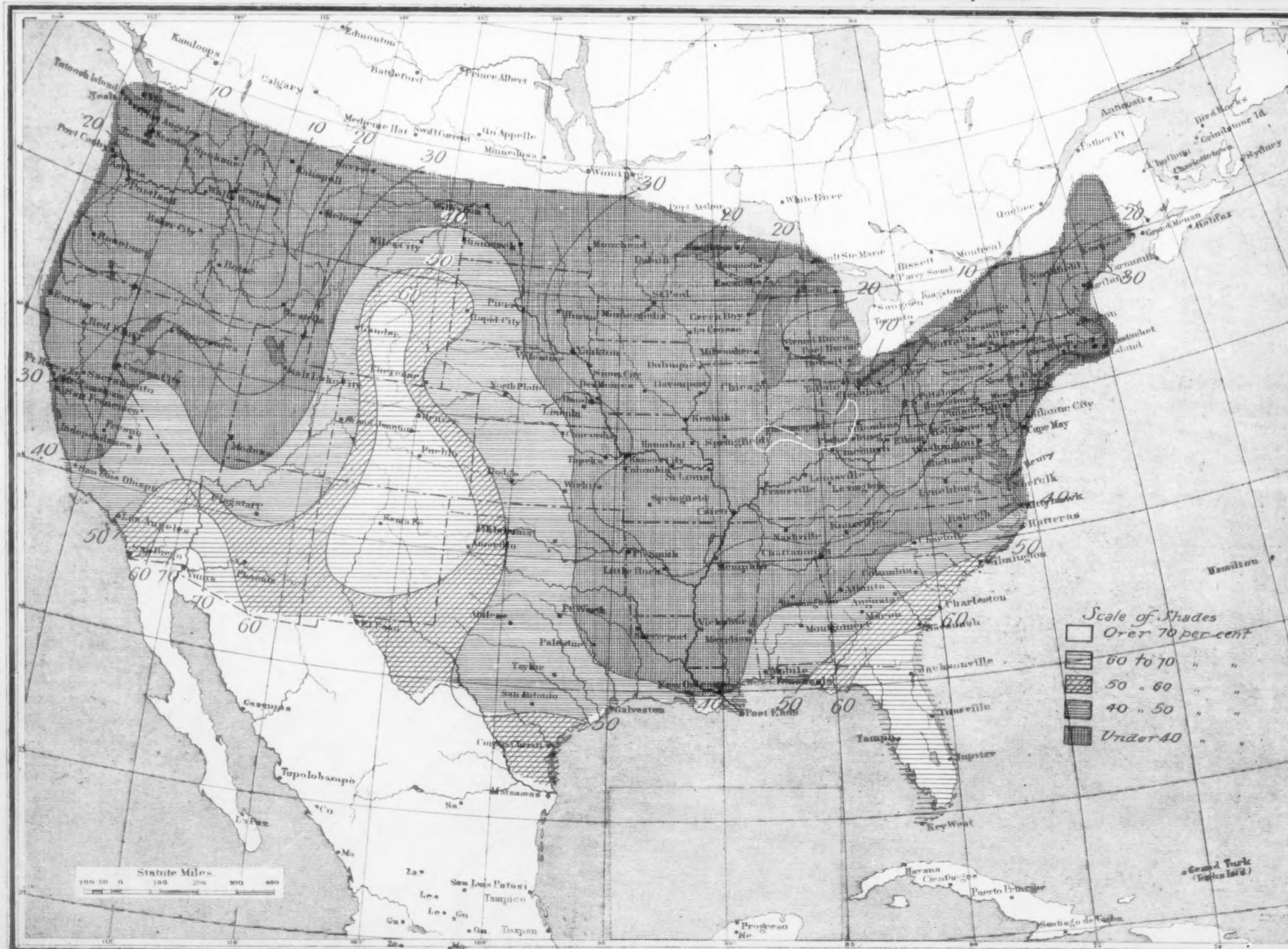

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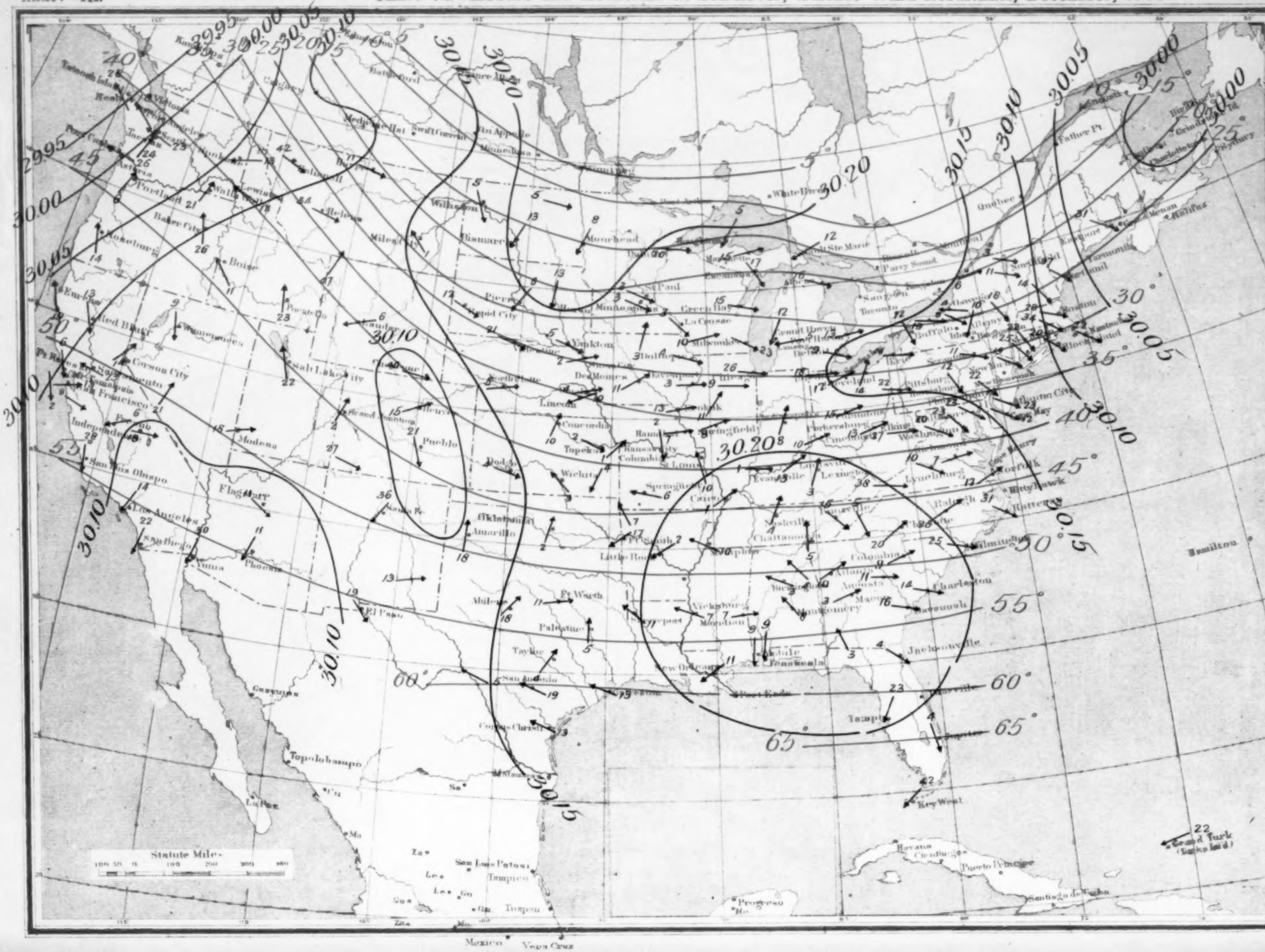

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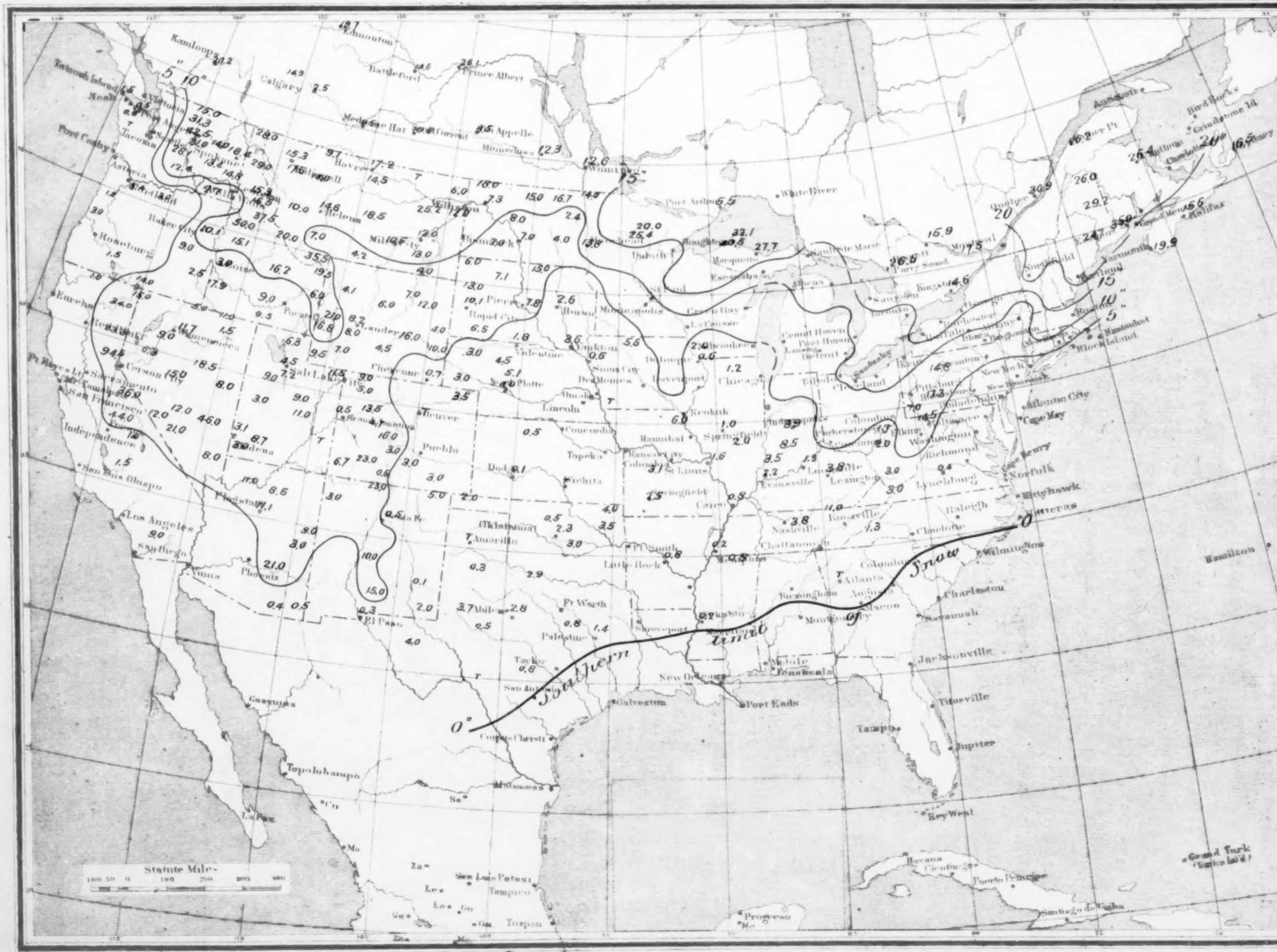
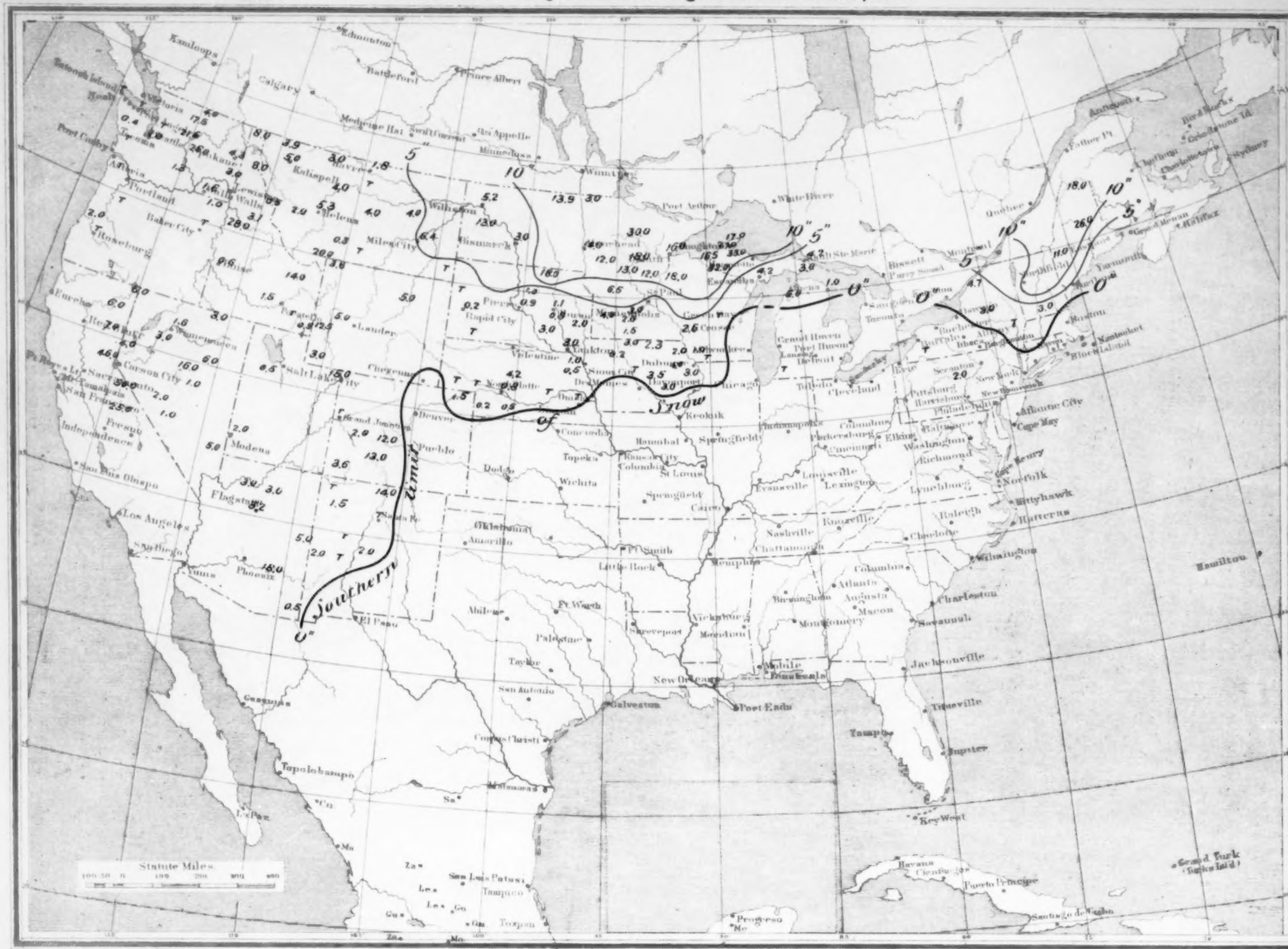


Chart VIII. Depth of Snow on ground December 31, 1906.



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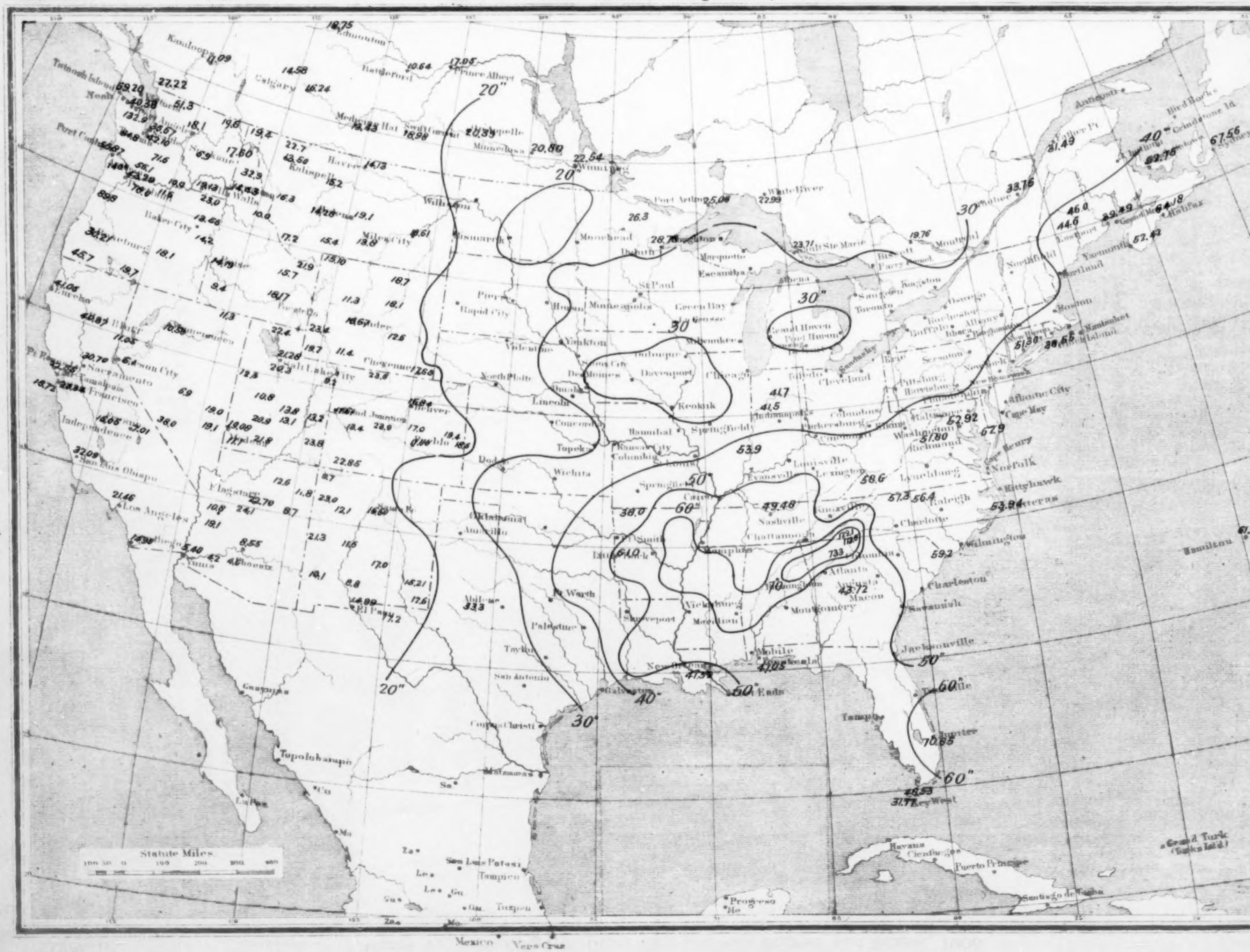

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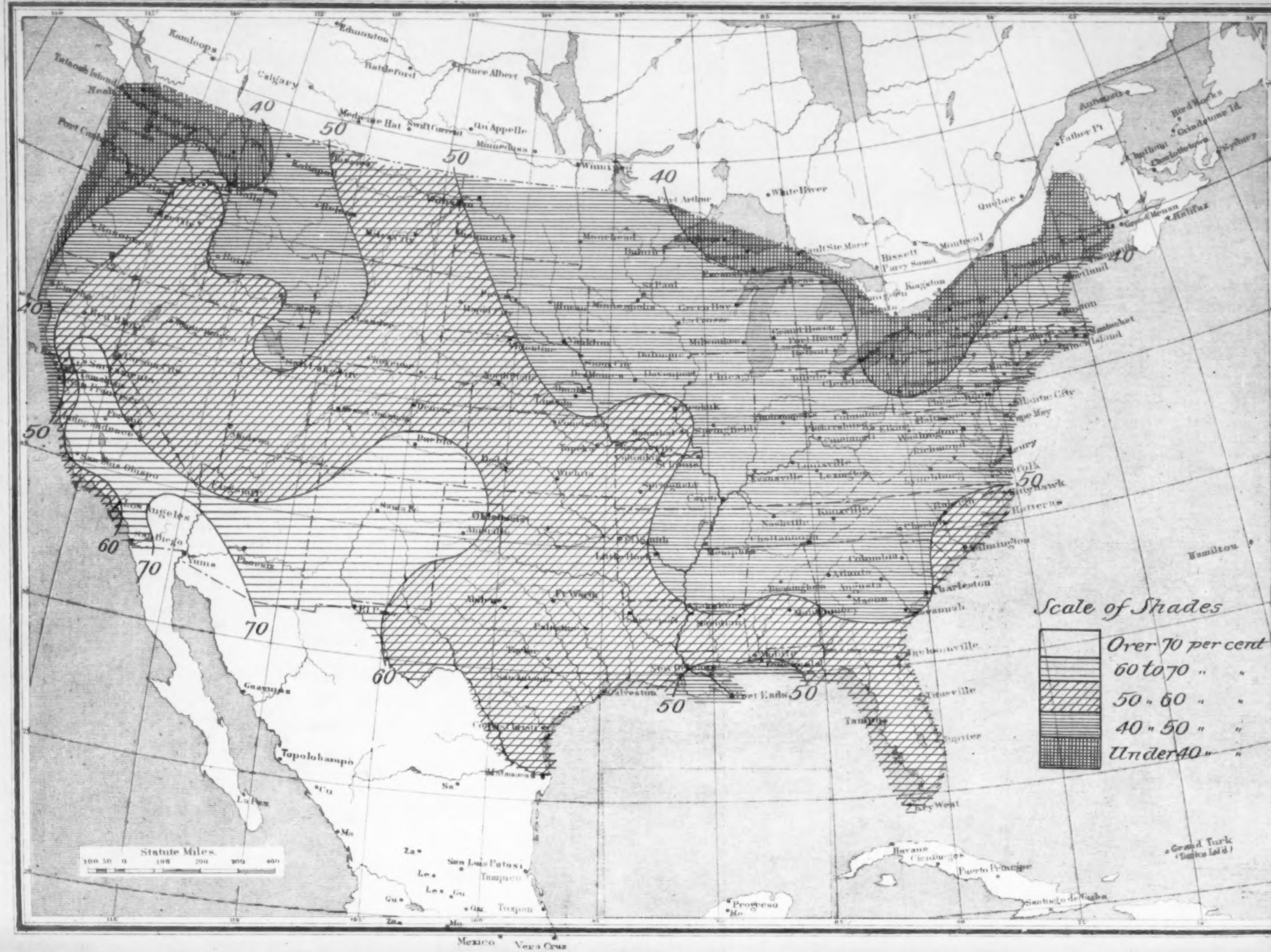

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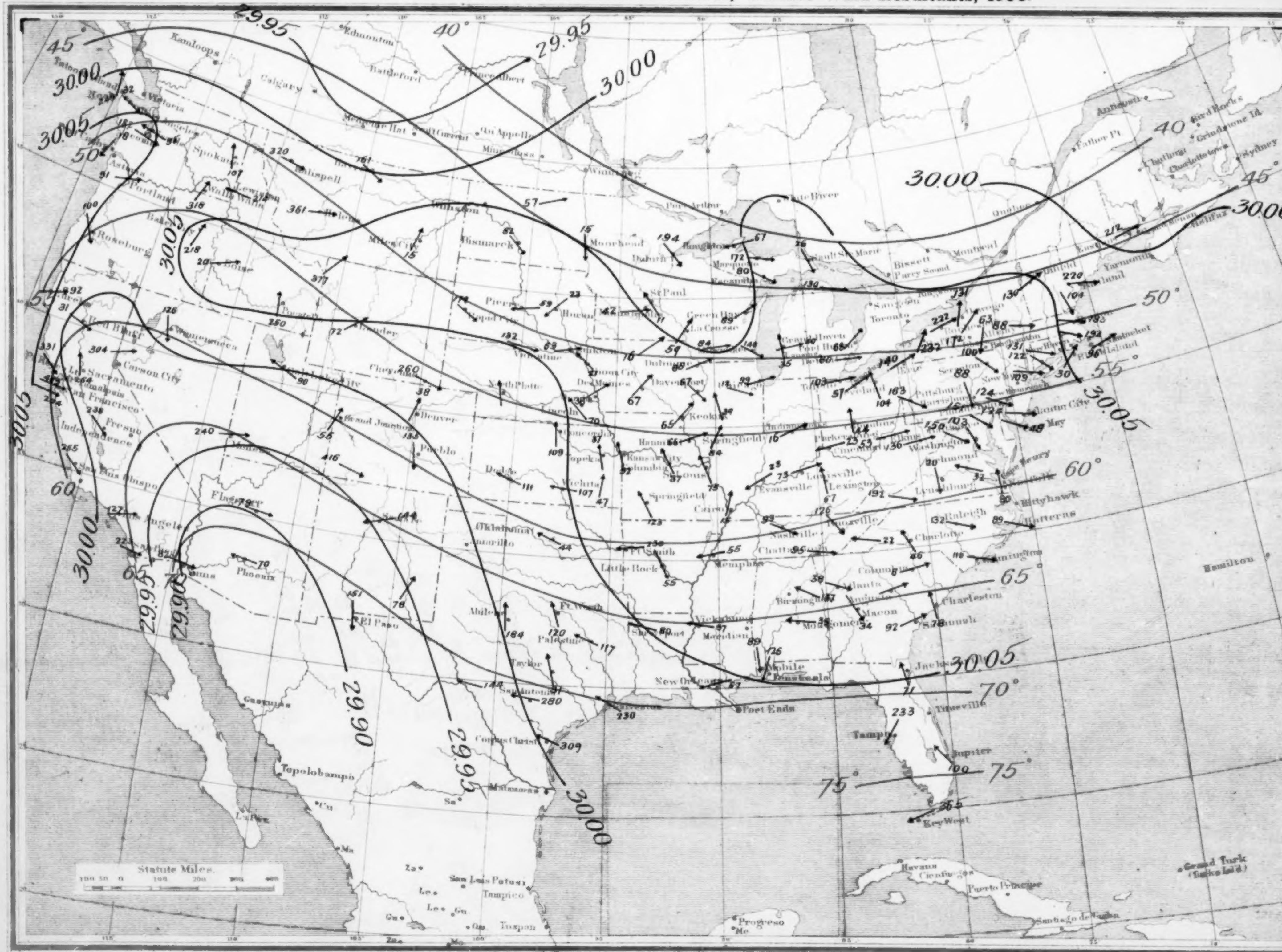

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Chart IX. Annual Absolute Maximum and Minimum Surface Temperatures, 1906.

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Chart X. Total Number of Thunderstorm Days, 1906.

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Chart XI. Departure of the Total Annual Precipitation, 1906, from the Normal.

W. B. No. 366.

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WEATHER BUREAU.

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